

The SEAMAN'S

1494. f. 11 (A)
Down
Daily Assistant,

BEING

A Short, Easy, and Plain Method

OF KEEPING

A JOURNAL at SEA,

In which are contained,

R U L E S, ²

S H E W I N G

How the Allowances for Leeway, Variation, Heave of the Sea, Set of Currents, &c. are to be made, and to correct the Dead-Reckoning by an Observation, in all Cases: And also all the TABLES that are any Ways necessary for the SEAMAN'S Use in keeping a Journal.

By THOMAS HASELDEN,
Late Teacher of the MATHEMATICS in the
ROYAL NAVY.

L O N D O N:

Printed for J. MOUNT, T. PAGE, W. MOUNT, and
T. PAGE, jun. on TOWER-HILL.

M,DCC,LXXX,



A Short, Easy, and Plain Method

OF KEEPING

A JOURNAL OF SEA

In which are contained

RULES

show the Allowances for Land, Water, and Fire;
Sea, and Currents, &c. &c. &c. and in other
the Dead Reckoning by an Observer in all cases;
and all the TABLES that are necessary for
the SEAMAN'S Use in keeping a Journal.

By THOMAS HASELTON

late Teacher of the MATHEMATICS in the
ROYAL NAVY

LONDON

Printed for J. MOUNT, T. PAGE, W. MOUNT, &c.

1. PAGE, in the Tower-Street.

MDCCCXX

T O T H E
R E A D E R.

HAVING been educated in the Theory of Navigation, almost from my Childhood, and having had about sixteen Years Experience of the Practical Part at Sea, both in the Merchants Service, and also as Teacher of the Mathematics in the ROYAL NAVY; and having, in the Course of that Time, generally observed, that many Seamen would gladly keep a Reckoning, had they any short, easy and plain Method to do it by; but are deterred from it by the Want thereof. And also, that there are others who throw their Money away to little or no Purpose, by going to School to such Masters, of which Sort (there are too many) that have only got a Smattering of the Theory, and a few Terms of Art by Rote, which enables them to talk in such a Manner as to deceive those they pretend to teach, and having never been at Sea, cannot know any Thing of the Practice.

Therefore, for the Use of such in particular, and all other Seafaring Men in general, I have written the following Treatise; in which, I think, I have inserted all the Rules, and all the Tables, with their Uses, that are necessary to be used in any Case at Sea: And also, particular Rules for keeping a Journal, with the Manner of correcting the Dead-Reckoning by an Observation, either for

one Day, or a longer Time; the first of which, viz. correcting for one Day, has been treated of by several Authors; but the latter, viz. correcting for a longer Time, I know has been barely mentioned in several, but not particularly explained by any Author at all, I believe, at least not in those I have read; and for that Reason I have done it in the Journal at the latter End of this Book, it being absolutely necessary for every Man who keeps a Reckoning to know it; because they are more likely to be out in their Reckoning, when they have one every Day, and consequently more necessary to correct for three or four Days, than for a single one.

I do not begin this Book with Arithmetic, as is common with most of the Books on this Subject; because I think, if any Person has had so little Education, as not to be capable of adding, subtracting, multiplying, and dividing, he will scarcely be able to make any Progress either in Arithmetic or Navigation, by the Help of Books alone, without the Assistance of a Master; and that putting such Things into Books of this Kind, serve only to enhance the Price, and are of no real Service to the Reader. And now having given an Account of the Reasons which induced me to publish this Book, (which I hope, and am pretty well assured, will be found the most useful Book of its Kind now extant) for the daily Practice at Sea. I have nothing more to add, but to beg the Reader's kind Acceptance of it.

And am



Their humble Servant,

Thomas Haselden.

C O N T E N T S.

- 1 **A** Table of Difference of Latitude and Departure to every single Degree, and as far as 300 Miles Distance, from Page 1, to Page 45.
- 2 A Table of Numbers, for the readier finding the Course in the Tables of Difference of Latitude and Departure, when any two Sides are given, Page 46.
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- 5 To work any Case in Mercator, Middle Latitude, Parallel, or any right angled Plane Triangle, Pages 53 and 54.
- 6 The first Case of Mercator (being the most useful Case at Sea) particularly explained and work'd at large, Pages 55 and 56.
- 7 A Table to turn Points into Degrees, &c. Page 56.
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Note, All the forementioned Tables are newly and carefully calculated, and the Tables of Latitude and Longitude carefully corrected from the best Authors and Charts.



A
T A B L E
O F
DIFFERENCE of LATITUDE
A N D
D E P A R T U R E
To every Single DEGREE,
And as far as 300 Miles DISTANCE.



DIFFERENCE OF LATITUDE

DEPARTURE

TO ANY SINGLE DEGREE

And as far as 300 Miles Distance

Difference of Latitude and Departure for 1 Deg.

1

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.0	51	51.0	00.9	101	101.0	01.8	151	151.0	02.6	201	201.0	03.5	251	251.0	04.3
2	02.0	00.0	52	52.0	00.9	02	102.0	01.8	52	152.0	02.6	02	202.0	03.5	52	252.0	04.3
3	03.0	00.1	53	53.0	00.9	03	103.0	01.8	53	153.0	02.6	03	203.0	03.5	53	253.0	04.3
4	04.0	00.1	54	54.0	00.9	04	104.0	01.8	54	154.0	02.7	04	204.0	03.5	54	254.0	04.4
5	05.0	00.1	55	55.0	01.0	05	105.0	01.8	55	155.0	02.7	05	205.0	03.5	55	255.0	04.4
6	06.0	00.1	56	56.0	01.0	106	106.0	01.8	156	156.0	02.7	206	206.0	03.5	256	256.0	04.4
7	07.0	00.1	57	57.0	01.0	07	107.0	01.9	57	157.0	02.7	07	207.0	03.6	57	257.0	04.4
8	08.0	00.1	58	58.0	01.0	08	108.0	01.9	58	158.0	02.7	08	208.0	03.6	58	258.0	04.4
9	09.0	00.2	59	59.0	01.0	09	109.0	01.9	59	159.0	02.7	09	209.0	03.6	59	259.0	04.4
10	10.0	00.2	60	60.0	01.1	10	110.0	01.9	60	160.0	02.8	10	210.0	03.6	60	260.0	04.5
11	11.0	00.2	61	61.0	01.1	111	111.0	01.9	161	161.0	02.8	211	211.0	03.6	261	261.0	04.5
12	12.0	00.2	62	62.0	01.1	12	112.0	01.9	62	162.0	02.8	12	212.0	03.6	62	262.0	04.5
13	13.0	00.2	63	63.0	01.1	13	113.0	02.0	63	163.0	02.8	13	213.0	03.7	63	263.0	04.5
14	14.0	00.2	64	64.0	01.1	14	114.0	02.0	64	164.0	02.8	14	214.0	03.7	64	264.0	04.5
15	15.0	00.3	65	65.0	01.1	15	115.0	02.0	65	165.0	02.9	15	215.0	03.7	65	265.0	04.6
16	16.0	00.3	66	66.0	01.2	116	116.0	02.0	166	166.0	02.9	216	216.0	03.7	266	266.0	04.6
17	17.0	00.3	67	67.0	01.2	17	117.0	02.0	67	167.0	02.9	17	217.0	03.7	67	267.0	04.6
18	18.0	00.3	68	68.0	01.2	18	118.0	02.1	68	168.0	02.9	18	218.0	03.8	68	268.0	04.6
19	19.0	00.3	69	69.0	01.2	19	119.0	02.1	69	169.0	02.9	19	219.0	03.8	69	269.0	04.6
20	20.0	00.4	70	70.0	01.2	20	120.0	02.1	70	170.0	02.9	20	220.0	03.8	70	270.0	04.6
21	21.0	00.4	71	71.0	01.2	21	121.0	02.1	71	171.0	03.0	221	221.0	03.8	271	271.0	04.7
22	22.0	00.4	72	72.0	01.3	22	122.0	02.1	72	172.0	03.0	22	222.0	03.8	72	272.0	04.7
23	23.0	00.4	73	73.0	01.3	23	123.0	02.1	73	173.0	03.0	23	223.0	03.8	73	273.0	04.7
24	24.0	00.4	74	74.0	01.3	24	124.0	02.2	74	174.0	03.0	24	224.0	03.9	74	274.0	04.7
25	25.0	00.4	75	75.0	01.3	25	125.0	02.2	75	175.0	03.0	25	225.0	03.9	75	275.0	04.7
26	26.0	00.5	76	76.0	01.3	26	126.0	02.2	76	176.0	03.0	226	226.0	03.9	276	276.0	04.7
27	27.0	00.5	77	77.0	01.3	27	127.0	02.2	77	177.0	03.1	27	227.0	03.9	77	277.0	04.8
28	28.0	00.5	78	78.0	01.4	28	128.0	02.2	78	178.0	03.1	28	228.0	03.9	78	278.0	04.8
29	29.0	00.5	79	79.0	01.4	29	129.0	02.2	79	179.0	03.1	29	229.0	03.9	79	279.0	04.8
30	30.0	00.5	80	80.0	01.4	30	130.0	02.3	80	180.0	03.1	30	230.0	04.0	80	280.0	04.8
31	31.0	00.5	81	81.0	01.4	31	131.0	02.3	81	181.0	03.1	231	231.0	04.0	281	281.0	04.8
32	32.0	00.6	82	82.0	01.4	32	132.0	02.3	82	182.0	03.1	32	232.0	04.0	82	282.0	04.8
33	33.0	00.6	83	83.0	01.5	33	133.0	02.3	83	183.0	03.2	33	233.0	04.0	83	283.0	04.9
34	34.0	00.6	84	84.0	01.5	34	134.0	02.3	84	184.0	03.2	34	234.0	04.0	84	284.0	04.9
35	35.0	00.6	85	85.0	01.5	35	135.0	02.3	85	185.0	03.2	35	235.0	04.0	85	285.0	04.9
36	36.0	00.6	86	86.0	01.5	36	136.0	02.4	86	186.0	03.2	236	236.0	04.1	286	286.0	04.9
37	37.0	00.6	87	87.0	01.5	37	137.0	02.4	87	187.0	03.2	37	237.0	04.1	87	287.0	04.9
38	38.0	00.7	88	88.0	01.5	38	138.0	02.4	88	188.0	03.2	38	238.0	04.1	88	288.0	04.9
39	39.0	00.7	89	89.0	01.6	39	139.0	02.4	89	189.0	03.3	39	239.0	04.1	89	289.0	05.0
40	40.0	00.7	90	90.0	01.6	40	140.0	02.4	90	190.0	03.3	40	240.0	04.1	90	290.0	05.0
41	41.0	00.7	91	91.0	01.6	41	141.0	02.4	91	191.0	03.3	241	241.0	04.1	291	291.0	05.0
42	42.0	00.7	92	92.0	01.6	42	142.0	02.5	92	192.0	03.3	42	242.0	04.2	92	292.0	05.0
43	43.0	00.8	93	93.0	01.6	43	143.0	02.5	93	193.0	03.3	43	243.0	04.2	93	293.0	05.0
44	44.0	00.8	94	94.0	01.6	44	144.0	02.5	94	194.0	03.3	44	244.0	04.2	94	294.0	05.0
45	45.0	00.8	95	95.0	01.7	45	145.0	02.5	95	195.0	03.4	45	245.0	04.2	95	295.0	05.1
46	46.0	00.8	96	96.0	01.7	46	146.0	02.5	96	196.0	03.4	246	246.0	04.2	296	296.0	05.1
47	47.0	00.8	97	97.0	01.7	47	147.0	02.5	97	197.0	03.4	47	247.0	04.2	97	297.0	05.1
48	48.0	00.8	98	98.0	01.7	48	148.0	02.6	98	198.0	03.4	48	248.0	04.3	98	298.0	05.1
49	49.0	00.9	99	99.0	01.7	49	149.0	02.6	99	199.0	03.4	49	249.0	04.3	99	299.0	05.1
50	50.0	00.9	100	100.0	01.7	150	150.0	02.6	200	200.0	03.4	250	250.0	04.3	300	300.0	05.1
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 89 Deg.

Difference of Latitude and Departure for 2 Deg.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.0	51	51.0	01.8	101	100.9	03.5	151	150.9	05.3	201	200.9	07.0	251	250.8	08.8
2	02.0	00.1	52	52.0	01.8	02	101.9	03.6	52	151.9	05.3	02	201.9	07.1	52	251.8	08.8
3	03.0	00.1	53	53.0	01.8	03	102.9	03.6	53	152.9	05.4	03	202.9	07.1	53	252.8	08.9
4	04.0	00.1	54	54.0	01.9	04	103.9	03.6	54	153.9	05.4	04	203.9	07.1	54	253.8	08.9
5	05.0	00.2	55	55.0	01.9	05	104.9	03.7	55	154.9	05.4	05	204.9	07.2	55	254.8	08.9
6	06.0	00.2	56	56.0	02.0	106	105.9	03.7	156	155.9	05.5	206	205.9	07.2	256	255.8	09.0
7	07.0	00.2	57	57.0	02.0	07	106.9	03.7	57	156.9	05.5	07	206.9	07.2	57	256.8	09.0
8	08.0	00.3	58	58.0	02.0	08	107.9	03.8	58	157.9	05.5	08	207.9	07.3	58	257.8	09.0
9	08.9	00.3	59	59.0	02.1	09	108.9	03.8	59	158.9	05.6	09	208.9	07.3	59	258.8	09.1
10	09.0	00.4	60	60.0	02.1	10	109.4	03.9	60	159.9	05.6	10	209.9	07.4	60	259.8	09.1
11	10.0	00.4	61	61.0	02.1	111	110.9	03.9	161	160.9	05.6	211	210.9	07.4	261	260.8	09.1
12	11.0	00.4	62	62.0	02.2	12	111.9	03.9	62	161.9	05.7	12	211.9	07.4	62	261.8	09.2
13	12.0	00.5	63	63.0	02.2	13	112.9	04.0	63	162.9	05.7	13	212.9	07.5	63	262.8	09.2
14	13.0	00.5	64	64.0	02.2	14	113.9	04.0	64	163.9	05.7	14	213.9	07.5	64	263.8	09.2
15	14.0	00.5	65	65.0	02.3	15	114.9	04.0	65	164.9	05.8	15	214.9	07.5	65	264.8	09.3
16	15.0	00.6	66	66.0	02.3	116	115.9	04.1	166	165.9	05.8	216	215.9	07.6	266	265.8	09.3
17	16.0	00.6	67	67.0	02.3	17	116.9	04.1	67	166.9	05.8	17	216.9	07.6	67	266.8	09.3
18	17.0	00.6	68	68.0	02.4	18	117.9	04.1	68	167.9	05.9	18	217.9	07.6	68	267.8	09.4
19	18.0	00.7	69	69.0	02.4	19	118.9	04.2	69	168.9	05.9	19	218.9	07.7	69	268.8	09.4
20	19.0	00.7	70	70.0	02.4	20	119.9	04.2	70	169.9	06.0	20	219.9	07.7	70	269.8	09.5
21	21.0	00.7	71	71.0	02.5	121	120.9	04.2	171	170.9	06.0	221	220.9	07.7	271	270.8	09.5
22	22.0	00.8	72	72.0	02.5	22	121.9	04.3	72	171.9	06.0	22	221.9	07.8	72	271.8	09.5
23	23.0	00.8	73	73.0	02.5	23	122.9	04.3	73	172.9	06.1	23	222.9	07.8	73	272.8	09.6
24	24.0	00.8	74	74.0	02.6	24	123.9	04.3	74	173.9	06.1	24	223.9	07.8	74	273.8	09.6
25	25.0	00.9	75	75.0	02.6	25	124.9	04.4	75	174.9	06.1	25	224.9	07.9	75	274.8	09.6
26	26.0	00.9	76	76.0	02.7	126	125.9	04.4	176	175.9	06.2	226	225.9	07.9	276	275.8	09.7
27	27.0	00.9	77	77.0	02.7	27	126.9	04.4	77	176.9	06.2	27	226.9	07.9	77	276.8	09.7
28	28.0	01.0	78	78.0	02.7	28	127.9	04.5	78	177.9	06.2	28	227.9	08.0	78	277.8	09.7
29	29.0	01.0	79	79.0	02.8	29	128.9	04.5	79	178.9	06.3	29	228.9	08.0	79	278.8	09.8
30	30.0	01.1	80	80.0	02.8	30	129.9	04.6	80	179.9	06.3	30	229.9	08.1	80	279.8	09.8
31	31.0	01.1	81	81.0	02.8	131	130.9	04.6	181	180.9	06.3	231	230.9	08.1	281	280.8	09.8
32	32.0	01.1	82	81.9	02.9	32	131.9	04.6	82	181.9	06.4	32	231.9	08.1	82	281.8	09.9
33	33.0	01.2	83	82.9	02.9	33	132.9	04.7	83	182.9	06.4	33	232.9	08.2	83	282.8	09.9
34	34.0	01.2	84	83.9	02.9	34	133.9	04.7	84	183.9	06.4	34	233.9	08.2	84	283.8	09.9
35	35.0	01.2	85	84.9	03.0	35	134.9	04.7	85	184.9	06.5	35	234.9	08.2	85	284.8	10.0
36	36.0	01.3	86	85.9	03.0	136	135.9	04.8	186	185.9	06.5	236	235.9	08.3	286	285.8	10.0
37	37.0	01.3	87	86.9	03.0	37	136.9	04.8	87	186.9	06.5	37	236.9	08.3	87	286.8	10.0
38	38.0	01.3	88	87.9	03.1	38	137.9	04.8	88	187.9	06.6	38	237.9	08.3	88	287.8	10.1
39	39.0	01.4	89	88.9	03.1	39	138.9	04.9	89	188.9	06.6	39	238.9	08.4	89	288.8	10.1
40	40.0	01.4	90	89.9	03.1	40	139.9	04.9	90	189.9	06.7	40	239.9	08.4	90	289.8	10.2
41	41.0	01.4	91	90.9	03.2	141	140.9	04.9	191	190.9	06.7	241	240.9	08.4	291	290.8	10.2
42	42.0	01.5	92	91.9	03.2	42	141.9	05.0	92	191.9	06.7	42	241.9	08.5	92	291.8	10.2
43	43.0	01.5	93	92.9	03.2	43	142.9	05.0	93	192.9	06.8	43	242.9	08.5	93	292.8	10.3
44	44.0	01.5	94	93.9	03.3	44	143.9	05.0	94	193.9	06.8	44	243.9	08.5	94	293.8	10.3
45	45.0	01.6	95	94.9	03.3	45	144.9	05.1	95	194.9	06.8	45	244.9	08.6	95	294.8	10.3
46	46.0	01.6	96	95.9	03.4	146	145.9	05.1	196	195.9	06.9	246	245.9	08.6	296	295.8	10.4
47	47.0	01.6	97	96.9	03.4	47	146.9	05.1	97	196.9	06.9	47	246.9	08.6	97	296.8	10.4
48	48.0	01.7	98	97.9	03.4	48	147.9	05.2	98	197.9	06.9	48	247.9	08.7	98	297.8	10.4
49	49.0	01.7	99	98.9	03.5	49	148.9	05.2	99	198.9	07.0	49	248.9	08.7	99	298.8	10.5
50	50.0	01.7	100	99.9	03.5	150	149.9	05.3	200	199.9	07.0	250	249.9	08.8	300	299.8	10.5
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 88 Deg.



Difference of Latitude and Departure for 3 Deg.

3

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	01.0	00.1	51	50.9	02.7	101	100.9	05.3	151	150.8	07.9	201	200.7	10.5	251	250.6	13.1
2	02.0	00.1	52	51.9	02.7	02	101.9	05.3	52	151.8	08.0	02	201.7	10.6	52	251.6	13.2
3	03.0	00.2	53	52.9	02.8	03	102.9	05.4	53	152.8	08.0	03	202.7	10.6	53	252.6	13.2
4	04.0	00.2	54	53.9	02.8	04	103.9	05.4	54	153.8	08.1	04	203.7	10.7	54	253.6	13.3
5	05.0	00.3	55	54.9	02.9	05	104.9	05.5	55	154.8	08.1	05	204.7	10.7	55	254.6	13.3
6	06.0	00.3	56	55.9	02.9	06	105.9	05.5	56	155.8	08.2	06	205.7	10.8	56	255.6	13.4
7	07.0	00.4	57	56.9	03.0	07	106.9	05.6	57	156.8	08.2	07	206.7	10.8	57	256.6	13.4
8	08.0	00.4	58	57.9	03.0	08	107.8	05.7	58	157.8	08.3	08	207.7	10.9	58	257.6	13.5
9	09.0	00.5	59	58.9	03.1	09	108.8	05.7	59	158.8	08.3	09	208.7	10.9	59	258.6	13.6
10	10.0	00.5	60	59.9	03.1	10	109.8	05.8	60	159.8	08.4	10	209.7	11.0	60	259.6	13.6
11	11.0	00.6	61	60.9	03.2	11	110.8	05.8	61	160.8	08.4	11	210.7	11.0	61	260.6	13.7
12	12.0	00.6	62	61.9	03.2	12	111.8	05.9	62	161.8	08.5	12	211.7	11.1	62	261.6	13.7
13	13.0	00.7	63	62.9	03.3	13	112.8	05.9	63	162.8	08.5	13	212.7	11.1	63	262.6	13.8
14	14.0	00.7	64	63.9	03.3	14	113.8	06.0	64	163.8	08.6	14	213.7	11.2	64	263.6	13.8
15	15.0	00.8	65	64.9	03.4	15	114.8	06.0	65	164.8	08.6	15	214.7	11.2	65	264.6	13.9
16	16.0	00.8	66	65.9	03.5	16	115.8	06.1	66	165.8	08.7	16	215.7	11.3	66	265.6	13.9
17	17.0	00.9	67	66.9	03.5	17	116.8	06.1	67	166.8	08.7	17	216.7	11.4	67	266.6	14.0
18	18.0	00.9	68	67.9	03.6	18	117.8	06.2	68	167.8	08.8	18	217.7	11.4	68	267.6	14.0
19	19.0	01.0	69	68.9	03.6	19	118.8	06.2	69	168.8	08.8	19	218.7	11.5	69	268.6	14.1
20	20.0	01.0	70	69.9	03.7	20	119.8	06.3	70	169.8	08.9	20	219.7	11.5	70	269.6	14.1
21	21.0	01.1	71	70.9	03.7	21	120.8	06.3	71	170.8	09.0	21	220.7	11.6	71	270.6	14.2
22	22.0	01.1	72	71.9	03.8	22	121.8	06.4	72	171.8	09.0	22	221.7	11.6	72	271.6	14.2
23	23.0	01.2	73	72.9	03.8	23	122.8	06.4	73	172.8	09.1	23	222.7	11.7	73	272.6	14.3
24	24.0	01.3	74	73.9	03.9	24	123.8	06.5	74	173.8	09.1	24	223.7	11.7	74	273.6	14.3
25	25.0	01.3	75	74.9	03.9	25	124.8	06.5	75	174.8	09.2	25	224.7	11.8	75	274.6	14.4
26	26.0	01.4	76	75.9	04.0	26	125.8	06.6	76	175.8	09.2	26	225.7	11.8	76	275.6	14.4
27	27.0	01.4	77	76.9	04.0	27	126.8	06.6	77	176.8	09.3	27	226.7	11.9	77	276.6	14.5
28	28.0	01.5	78	77.9	04.1	28	127.8	06.7	78	177.8	09.3	28	227.7	11.9	78	277.6	14.5
29	29.0	01.5	79	78.9	04.1	29	128.8	06.8	79	178.7	09.4	29	228.7	12.0	79	278.6	14.6
30	30.0	01.6	80	79.9	04.2	30	129.8	06.8	80	179.7	09.4	30	229.7	12.0	80	279.6	14.7
31	31.0	01.6	81	80.9	04.2	31	130.8	06.9	81	180.7	09.5	31	230.7	12.1	81	280.6	14.7
32	32.0	01.7	82	81.9	04.3	32	131.8	06.9	82	181.7	09.5	32	231.7	12.1	82	281.6	14.8
33	33.0	01.7	83	82.9	04.3	33	132.8	07.0	83	182.7	09.6	33	232.7	12.2	83	282.6	14.8
34	34.0	01.8	84	83.9	04.4	34	133.8	07.0	84	183.7	09.6	34	233.7	12.2	84	283.6	14.9
35	35.0	01.8	85	84.9	04.4	35	134.8	07.1	85	184.7	09.7	35	234.7	12.3	85	284.6	14.9
36	35.9	01.9	86	85.9	04.5	36	135.8	07.1	86	185.7	09.7	36	235.7	12.3	86	285.6	15.0
37	36.9	01.9	87	86.9	04.6	37	136.8	07.2	87	186.7	09.8	37	236.7	12.4	87	286.6	15.0
38	37.9	02.0	88	87.9	04.6	38	137.8	07.2	88	187.7	09.8	38	237.7	12.5	88	287.6	15.1
39	38.9	02.0	89	88.9	04.7	39	138.8	07.3	89	188.7	09.9	39	238.7	12.5	89	288.6	15.1
40	39.9	02.1	90	89.9	04.7	40	139.8	07.3	90	189.7	09.9	40	239.7	12.6	90	289.6	15.2
41	40.9	02.1	91	90.9	04.8	41	140.8	07.4	91	190.7	10.0	41	240.7	12.6	91	290.6	15.2
42	41.9	02.2	92	91.9	04.8	42	141.8	07.4	92	191.7	10.0	42	241.7	12.7	92	291.6	15.3
43	42.9	02.2	93	92.9	04.9	43	142.8	07.5	93	192.7	10.1	43	242.7	12.7	93	292.6	15.3
44	43.9	02.3	94	93.9	04.9	44	143.8	07.5	94	193.7	10.1	44	243.7	12.8	94	293.6	15.4
45	44.9	02.4	95	94.9	05.0	45	144.8	07.6	95	194.7	10.2	45	244.7	12.8	95	294.6	15.4
46	45.9	02.4	96	95.9	05.0	46	145.8	07.6	96	195.7	10.3	46	245.7	12.9	96	295.6	15.5
47	46.9	02.5	97	96.9	05.1	47	146.8	07.7	97	196.7	10.3	47	246.7	12.9	97	296.6	15.5
48	47.9	02.5	98	97.9	05.1	48	147.8	07.7	98	197.7	10.4	48	247.7	13.0	98	297.6	15.6
49	48.9	02.6	99	98.9	05.2	49	148.8	07.8	99	198.7	10.4	49	248.7	13.0	99	298.6	15.6
50	49.9	02.6	100	99.9	05.2	50	149.8	07.9	200	199.7	10.5	250	249.7	13.1	300	279.6	15.7
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 87 Deg.

4 Difference of Latitude and Departure for 4 Deg.

Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep
1	01.0	00.1	51	50.9	03.6	101	100.8	07.0	151	150.6	10.5	201	200.5	14.0	251	250.4	17.5
2	02.0	00.1	52	51.9	03.6	02	101.8	07.1	52	151.6	10.6	02	201.5	14.1	52	251.4	17.6
3	03.0	00.2	53	52.9	03.7	03	102.8	07.2	53	152.6	10.7	03	202.5	14.1	53	252.4	17.6
4	04.0	00.3	54	53.9	03.8	04	103.8	07.2	54	153.6	10.7	04	203.5	14.2	54	253.4	17.7
5	05.0	00.3	55	54.9	03.8	05	104.7	07.3	55	154.6	10.8	05	204.5	14.3	55	254.4	17.8
6	06.0	00.4	56	55.9	03.9	106	105.7	07.4	156	155.6	10.9	206	205.5	14.4	256	255.4	17.8
7	07.0	00.5	57	56.9	04.0	07	106.7	07.5	57	156.6	10.9	07	206.5	14.4	57	256.4	17.9
8	08.0	00.6	58	57.9	04.0	08	107.7	07.5	58	157.6	11.0	08	207.5	14.5	58	257.4	18.0
9	09.0	00.6	59	58.9	04.1	09	108.7	07.6	59	158.6	11.1	09	208.5	14.6	59	258.4	18.1
10	10.0	00.7	60	59.9	04.2	10	109.7	07.7	60	159.6	11.2	10	209.5	14.6	60	259.4	18.1
11	11.0	00.8	61	60.9	04.3	111	110.7	07.7	161	160.6	11.2	211	210.5	14.7	261	260.4	18.2
12	12.0	00.8	62	61.9	04.3	12	111.7	07.8	62	161.6	11.3	12	211.5	14.8	62	261.4	18.3
13	13.0	00.9	63	62.8	04.4	13	112.7	07.9	63	162.6	11.4	13	212.5	14.8	63	262.4	18.3
14	14.0	01.0	64	63.8	04.5	14	113.7	07.9	64	163.6	11.4	14	213.5	14.9	64	263.4	18.4
15	15.0	01.0	65	64.8	04.5	15	114.7	08.0	65	164.6	11.5	15	214.5	15.0	65	264.4	18.5
16	16.0	01.1	66	65.8	04.6	116	115.7	08.1	166	165.6	11.6	216	215.5	15.1	266	265.4	18.5
17	17.0	01.2	67	66.8	04.7	17	116.7	08.2	67	166.6	11.6	17	216.5	15.1	67	266.4	18.6
18	18.0	01.3	68	67.8	04.7	18	117.7	08.2	68	167.6	11.7	18	217.5	15.2	68	267.4	18.7
19	19.0	01.3	69	68.8	04.8	19	118.7	08.3	69	168.6	11.8	19	218.5	15.3	69	268.4	18.7
20	20.0	01.4	70	69.8	04.9	20	119.7	08.4	70	169.6	11.8	20	219.5	15.3	70	269.4	18.8
21	20.9	01.5	71	70.8	05.0	121	120.7	08.4	171	170.6	11.9	221	220.5	15.4	271	270.3	18.9
22	21.9	01.5	72	71.8	05.0	22	121.7	08.5	72	171.6	12.0	22	221.5	15.5	72	271.3	19.0
23	22.9	01.6	73	72.8	05.1	23	122.7	08.6	73	172.6	12.1	23	222.5	15.5	73	272.3	19.0
24	23.9	01.7	74	73.8	05.2	24	123.7	08.6	74	173.6	12.1	24	223.5	15.6	74	273.3	19.1
25	24.9	01.7	75	74.8	05.2	25	124.7	08.7	75	174.6	12.2	25	224.5	15.7	75	274.3	19.2
26	25.9	01.8	76	75.8	05.3	126	125.7	08.8	176	175.6	12.3	226	225.5	15.8	276	275.3	19.2
27	26.9	01.9	77	76.8	05.4	27	126.7	08.9	77	176.6	12.3	27	226.5	15.8	77	276.3	19.3
28	27.9	02.0	78	77.8	05.4	28	127.7	08.9	78	177.6	12.4	28	227.5	15.9	78	277.3	19.4
29	28.9	02.0	79	78.8	05.5	29	128.7	09.0	79	178.6	12.5	29	228.5	16.0	79	278.3	19.4
30	29.9	02.1	80	79.8	05.6	30	129.7	09.1	80	179.6	12.5	30	229.4	16.0	80	279.3	19.5
31	30.9	02.2	81	80.8	05.7	131	130.7	09.1	181	180.6	12.6	231	230.4	16.1	281	280.3	19.6
32	31.9	02.2	82	81.8	05.7	32	131.7	09.2	82	181.6	12.7	32	231.4	16.2	82	281.3	19.7
33	32.9	02.3	83	82.8	05.8	33	132.7	09.3	83	182.6	12.8	33	232.4	16.2	83	282.3	19.7
34	33.9	02.4	84	83.8	05.9	34	133.7	09.3	84	183.6	12.8	34	233.4	16.3	84	283.3	19.8
35	34.9	02.4	85	84.8	05.9	35	134.7	09.4	85	184.6	12.9	35	234.4	16.4	85	284.3	19.9
36	35.9	02.5	86	85.8	06.0	136	135.7	09.5	186	185.6	13.0	236	235.4	16.4	286	285.3	19.9
37	36.9	02.6	87	86.8	06.1	37	136.7	09.5	87	186.6	13.0	37	236.4	16.5	87	286.3	20.0
38	37.9	02.7	88	87.8	06.1	38	137.7	09.6	88	187.5	13.1	38	237.4	16.6	88	287.3	20.1
39	38.9	02.7	89	88.8	06.2	39	138.7	09.7	89	188.5	13.2	39	238.4	16.7	89	288.3	20.1
40	39.9	02.8	90	89.8	06.3	40	139.7	09.8	90	189.5	13.2	40	239.4	16.7	90	289.3	20.2
41	40.9	02.9	91	90.8	06.4	141	140.7	09.8	191	190.5	13.3	241	240.4	16.8	291	290.3	20.3
42	41.9	02.9	92	91.8	06.4	42	141.7	09.9	92	191.5	13.4	42	241.4	16.9	92	291.3	20.4
43	42.9	03.0	93	92.8	06.5	43	142.7	10.0	93	192.5	13.5	43	242.4	17.0	93	292.3	20.4
44	43.9	03.1	94	93.8	06.6	44	143.7	10.0	94	193.5	13.5	44	243.4	17.0	94	293.3	20.5
45	44.9	03.1	95	94.8	06.6	45	144.7	10.1	95	194.5	13.6	45	244.4	17.1	95	294.3	20.6
46	45.9	03.2	96	95.8	06.7	146	145.6	10.2	196	195.5	13.7	246	245.4	17.1	296	295.3	20.6
47	46.9	03.3	97	96.8	06.8	47	146.6	10.2	97	196.5	13.7	47	246.4	17.2	97	296.3	20.7
48	47.9	03.4	98	97.8	06.8	48	147.6	10.3	98	197.5	13.8	48	247.4	17.3	98	297.3	20.8
49	48.9	03.4	99	98.8	06.9	49	148.6	10.4	99	198.5	13.9	49	248.4	17.4	99	298.3	20.8
50	49.9	03.5	100	99.8	07.0	150	149.6	10.5	200	199.5	13.9	250	249.4	17.4	300	299.3	20.9
Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat

for 86 Deg.

Difference of Latitude and Departure for 5 Deg.

5

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	01.0	00.1	51	50.8	04.4	101	100.6	08.8	151	150.4	13.1	201	200.2	17.5	251	250.0	21.8
2	02.0	00.2	52	51.8	04.5	02	101.6	08.9	52	151.4	13.2	02	201.2	17.6	52	251.0	21.9
3	03.0	00.3	53	52.8	04.6	03	102.6	09.0	53	152.4	13.3	03	202.2	17.7	53	252.0	22.0
4	04.0	00.3	54	53.8	04.7	04	103.6	09.0	54	153.4	13.4	04	203.2	17.7	54	253.0	22.1
5	05.0	00.4	55	54.8	04.8	05	104.6	09.1	55	154.4	13.5	05	204.2	17.8	55	254.0	22.2
6	06.0	00.5	56	55.8	04.9	106	105.6	09.2	156	155.4	13.6	206	205.2	17.9	256	255.0	22.3
7	07.0	00.6	57	56.8	05.0	07	106.6	09.3	57	156.4	13.7	07	206.2	18.0	57	256.0	22.4
8	08.0	00.7	58	57.8	05.1	08	107.6	09.4	58	157.4	13.7	08	207.2	18.1	58	257.0	22.4
9	09.0	00.8	59	58.8	05.1	09	108.6	09.5	59	158.4	13.8	09	208.2	18.2	59	258.0	22.5
10	10.0	00.9	60	59.8	05.2	10	109.6	09.6	60	159.4	13.9	10	209.2	18.3	60	259.0	22.6
11	11.0	01.0	61	60.8	05.3	111	110.6	09.7	161	160.4	14.0	211	210.2	18.4	261	260.0	22.7
12	12.0	01.0	62	61.8	05.4	12	111.6	09.7	62	161.4	14.1	12	211.2	18.4	62	261.0	22.8
13	12.9	01.1	63	62.8	05.5	13	112.6	09.8	63	162.4	14.2	13	212.2	18.5	63	262.0	22.9
14	13.9	01.2	64	63.8	05.6	14	113.6	09.9	64	163.4	14.3	14	213.2	18.6	64	263.0	23.0
15	14.9	01.3	65	64.8	05.7	15	114.6	10.0	65	164.4	14.4	15	214.2	18.7	65	264.0	23.1
16	15.9	01.4	66	65.7	05.8	116	115.6	10.1	166	165.4	14.4	216	215.2	18.8	266	265.0	23.1
17	16.9	01.5	67	66.7	05.8	17	116.6	10.2	67	166.4	14.5	17	216.2	18.9	67	266.0	23.2
18	17.9	01.6	68	67.7	05.9	18	117.6	10.3	68	167.4	14.6	18	217.2	19.0	68	267.0	23.3
19	18.9	01.7	69	68.7	06.0	19	118.5	10.4	69	168.4	14.7	19	218.2	19.1	69	268.0	23.4
20	19.9	01.7	70	69.7	06.1	20	119.5	10.4	70	169.4	14.8	20	219.2	19.1	70	269.0	23.5
21	20.9	01.8	71	70.7	06.2	121	120.5	10.5	171	170.4	14.9	221	220.2	19.2	271	270.0	23.6
22	21.9	01.9	72	71.7	06.3	22	121.5	10.6	72	171.3	15.0	22	221.2	19.3	72	271.0	23.7
23	22.9	02.0	73	72.7	06.4	23	122.5	10.7	73	172.3	15.1	23	222.2	19.4	73	272.0	23.8
24	23.9	02.1	74	73.7	06.5	24	123.5	10.8	74	173.3	15.1	24	223.1	19.5	74	273.0	23.8
25	24.9	02.2	75	74.7	06.5	25	124.5	10.9	75	174.3	15.2	25	224.1	19.6	75	274.0	23.9
26	25.9	02.3	76	75.7	06.6	126	125.5	11.0	176	175.3	15.3	226	225.1	19.7	276	275.0	24.0
27	26.9	02.4	77	76.7	06.7	27	126.5	11.0	77	176.3	15.4	27	226.1	19.7	77	275.9	24.1
28	27.9	02.4	78	77.7	06.8	28	127.5	11.1	78	177.3	15.5	28	227.1	19.8	78	276.9	24.2
29	28.9	02.5	79	78.7	06.9	29	128.5	11.2	79	178.3	15.6	29	228.1	19.9	79	277.9	24.3
30	29.9	02.6	80	79.7	07.0	30	129.5	11.3	80	179.3	15.7	30	229.1	20.0	80	278.9	24.4
31	30.9	02.7	81	80.7	07.1	131	130.5	11.4	181	180.3	15.7	231	230.1	20.1	281	279.9	24.4
32	31.9	02.8	82	81.7	07.2	32	131.5	11.5	82	181.3	15.8	32	231.1	20.2	82	280.9	24.5
33	32.9	02.9	83	82.7	07.2	33	132.5	11.6	83	182.3	15.9	33	232.1	20.3	83	281.9	24.6
34	33.9	03.0	84	83.7	07.3	34	133.5	11.7	84	183.3	16.0	34	233.1	20.4	84	282.9	24.7
35	34.9	03.1	85	84.7	07.4	35	134.5	11.7	85	184.3	16.1	35	234.1	20.4	85	283.9	24.8
36	35.9	03.1	86	85.7	07.5	136	135.5	11.8	186	185.3	16.2	236	235.1	20.5	286	284.9	24.9
37	36.9	03.2	87	86.7	07.6	37	136.5	11.9	87	186.3	16.3	37	236.1	20.6	87	285.9	25.0
38	37.9	03.3	88	87.7	07.7	38	137.5	12.0	88	187.3	16.4	38	237.1	20.7	88	286.9	25.1
39	38.9	03.4	89	88.7	07.8	39	138.5	12.1	89	188.3	16.4	39	238.1	20.8	89	287.9	25.1
40	39.8	03.5	90	89.7	07.8	40	139.5	12.2	90	189.3	16.5	40	239.1	20.9	90	288.9	25.2
41	40.8	03.6	91	90.7	07.9	141	140.5	12.3	191	190.3	16.6	241	240.1	21.0	291	289.9	25.3
42	41.8	03.7	92	91.6	08.0	42	141.5	12.4	92	191.3	16.7	42	241.1	21.1	92	290.9	25.4
43	42.8	03.9	93	92.6	08.1	43	142.5	12.4	93	192.3	16.8	43	242.1	21.1	93	291.9	25.5
44	43.8	03.8	94	93.6	08.2	44	143.5	12.5	94	193.3	16.9	44	243.1	21.2	94	292.9	25.6
45	44.8	03.9	95	94.6	08.3	45	144.4	12.6	95	194.3	17.0	45	244.1	21.3	95	293.9	25.7
46	45.8	04.0	96	95.6	08.4	146	145.4	12.7	196	195.3	17.1	246	245.1	21.4	296	294.9	25.8
47	46.8	04.1	97	96.6	08.5	47	146.4	12.8	97	196.3	17.1	47	246.1	21.5	97	295.9	25.8
48	47.8	04.2	98	97.6	08.5	48	147.4	12.9	98	197.2	17.2	48	247.1	21.6	98	296.9	25.9
49	48.8	04.3	99	98.6	08.6	49	148.4	13.0	99	198.2	17.3	49	248.1	21.7	99	297.9	26.0
50	49.8	04.4	100	99.6	08.7	150	149.4	13.1	200	199.2	17.4	250	249.1	21.8	300	298.9	26.1
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 85 Deg.

6 Difference of Latitude and Departure for 6 Deg.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.1	51	50.7	05.3	101	100.4	10.6	151	150.2	15.8	201	199.9	21.0	251	249.6	26.2
2	02.0	00.2	52	51.7	05.4	02	101.4	10.7	52	151.2	15.9	02	200.9	21.1	52	250.6	26.3
3	03.0	00.3	53	52.7	05.5	03	102.4	10.8	53	152.2	16.0	03	201.9	21.2	53	251.6	26.4
4	04.0	00.4	54	53.7	05.6	04	103.4	10.9	54	153.2	16.1	04	202.9	21.3	54	252.6	26.5
5	05.0	00.5	55	54.7	05.7	05	104.4	11.0	55	154.1	16.2	05	203.9	21.4	55	253.6	26.6
6	06.0	00.6	56	55.7	05.9	106	105.4	11.1	156	155.1	16.3	206	204.9	21.5	256	254.6	26.8
7	07.0	00.7	57	56.7	06.0	07	106.4	11.2	57	156.1	16.4	07	205.9	21.6	57	255.6	26.9
8	08.0	00.8	58	57.7	06.1	08	107.4	11.3	58	157.1	16.5	08	206.9	21.7	58	256.6	27.0
9	09.9	00.9	59	58.7	06.2	09	108.4	11.4	59	158.1	16.6	09	207.9	21.8	59	257.6	27.1
10	10.9	01.0	60	59.7	06.3	10	109.4	11.5	60	159.1	16.7	10	208.8	21.9	60	258.6	27.2
11	11.9	01.1	61	60.7	06.4	111	110.4	11.6	161	160.1	16.8	211	209.8	22.0	261	259.6	27.3
12	12.9	01.3	62	61.7	06.5	12	111.4	11.7	62	161.1	16.9	12	210.8	22.2	62	260.6	27.4
13	13.9	01.4	63	62.7	06.6	13	112.4	11.8	63	162.1	17.0	13	211.8	22.3	63	261.6	27.5
14	14.9	01.5	64	63.6	06.7	14	113.4	11.9	64	163.1	17.1	14	212.8	22.4	64	262.5	27.6
15	15.9	01.6	65	64.6	06.8	15	114.4	12.0	65	164.1	17.2	15	213.8	22.5	65	263.5	27.7
16	16.9	01.7	66	65.6	06.9	116	115.4	12.1	166	165.1	17.3	216	214.8	22.6	266	264.5	27.8
17	17.9	01.8	67	66.6	07.0	17	116.4	12.2	67	166.1	17.5	17	215.8	22.7	67	265.5	27.9
18	18.9	01.9	68	67.6	07.1	18	117.4	12.3	68	167.1	17.6	18	216.8	22.8	68	266.5	28.0
19	19.9	02.0	69	68.6	07.2	19	118.3	12.4	69	168.1	17.7	19	217.8	22.9	69	267.5	28.1
20	20.9	02.1	70	69.6	07.3	20	119.3	12.5	70	169.1	17.8	20	218.8	23.0	70	268.5	28.2
21	20.9	02.2	71	70.6	07.4	121	120.3	12.6	171	170.1	17.9	221	219.8	23.1	271	269.5	28.3
22	21.9	02.3	72	71.6	07.5	22	121.3	12.7	72	171.1	18.0	22	220.8	23.2	72	270.5	28.4
23	22.9	02.4	73	72.6	07.6	23	122.3	12.9	73	172.0	18.1	23	221.8	23.3	73	271.5	28.5
24	23.9	02.5	74	73.6	07.7	24	123.3	13.0	74	173.0	18.2	24	222.8	23.4	74	272.5	28.6
25	24.9	02.6	75	74.6	07.8	25	124.3	13.1	75	174.0	18.3	25	223.8	23.5	75	273.5	28.7
26	25.9	02.7	76	75.6	07.9	126	125.3	13.2	176	175.0	18.4	226	224.8	23.6	276	274.5	28.8
27	26.9	02.8	77	76.6	08.0	27	126.3	13.3	77	176.0	18.5	27	225.8	23.7	77	275.5	28.9
28	27.8	02.9	78	77.6	08.1	28	127.3	13.4	78	177.0	18.6	28	226.7	23.8	78	276.5	29.1
29	28.8	03.0	79	78.6	08.3	29	128.3	13.5	79	178.0	18.7	29	227.7	23.9	79	277.5	29.2
30	29.8	03.1	80	79.6	08.4	30	129.3	13.6	80	179.0	18.8	30	228.7	24.0	80	278.5	29.3
31	30.8	03.2	81	80.6	08.5	131	130.3	13.7	181	180.0	18.9	231	229.7	24.1	281	279.5	29.4
32	31.8	03.3	82	81.5	08.6	32	131.3	13.8	82	181.0	19.0	32	230.7	24.2	82	280.4	29.5
33	32.8	03.4	83	82.5	08.7	33	132.3	13.9	83	182.0	19.1	33	231.7	24.3	83	281.4	29.6
34	33.8	03.6	84	83.5	08.8	34	133.3	14.0	84	183.0	19.2	34	232.7	24.5	84	282.4	29.7
35	34.8	03.7	85	84.5	08.9	35	134.3	14.1	85	184.0	19.3	35	233.7	24.6	85	283.4	29.8
36	35.8	03.8	86	85.5	09.0	136	135.3	14.2	186	185.0	19.4	236	234.7	24.7	286	284.4	29.9
37	36.8	03.9	87	86.5	09.1	37	136.2	14.3	87	186.0	19.5	37	235.7	24.8	87	285.4	30.0
38	37.8	04.0	88	87.5	09.2	38	137.2	14.4	88	187.0	19.6	38	236.7	24.9	88	286.4	30.1
39	38.8	04.1	89	88.5	09.3	39	138.2	14.5	89	188.0	19.8	39	237.7	25.0	89	287.4	30.2
40	39.8	04.2	90	89.5	09.4	40	139.2	14.6	90	189.0	19.9	40	238.7	25.1	90	288.4	30.3
41	40.8	04.3	91	90.5	09.5	141	140.2	14.7	191	189.9	20.0	241	239.7	25.2	291	289.4	30.4
42	41.8	04.4	92	91.5	09.6	42	141.2	14.8	92	190.9	20.1	42	240.7	25.3	92	290.4	30.5
43	42.8	04.5	93	92.5	09.7	43	142.2	14.9	93	191.9	20.2	43	241.7	25.4	93	291.4	30.6
44	43.8	04.6	94	93.5	09.8	44	143.2	15.0	94	192.9	20.3	44	242.7	25.5	94	292.4	30.7
45	44.8	04.7	95	94.5	09.9	45	144.2	15.2	95	193.9	20.4	45	243.7	25.6	95	293.4	30.8
46	45.7	04.8	96	95.5	10.0	146	145.2	15.3	196	194.9	20.5	246	244.6	25.7	296	294.4	30.9
47	46.7	04.9	97	96.5	10.1	47	146.2	15.4	97	195.9	20.6	47	245.6	25.8	97	295.4	31.0
48	47.7	05.0	98	97.5	10.2	48	147.2	15.5	98	196.9	20.7	48	246.6	25.9	98	296.4	31.1
49	48.7	05.1	99	98.5	10.3	49	148.2	15.6	99	197.9	20.8	49	247.6	26.0	99	297.4	31.2
50	49.7	05.2	100	99.5	10.5	150	149.2	15.7	200	198.9	20.9	250	248.6	26.1	300	298.4	31.4
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 84 Deg.

Difference of Latitude and Departure for 7 Deg.

7

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	01.0	00.1	51	50.6	06.2	101	100.2	12.3	151	149.9	18.4	201	199.5	24.5	251	249.1	30.6
2	02.0	00.2	52	51.6	06.3	02	101.2	12.4	52	150.9	18.5	02	200.5	24.6	52	250.1	30.7
3	03.0	00.4	53	52.6	06.5	03	102.2	12.5	53	151.9	18.6	03	201.5	24.7	53	251.1	30.8
4	04.0	00.5	54	53.6	06.6	04	103.2	12.7	54	152.8	18.7	04	202.5	24.8	54	252.1	30.9
5	05.0	00.6	55	54.6	06.7	05	104.2	12.8	55	153.8	18.9	05	203.5	25.0	55	253.1	31.0
6	06.0	00.7	56	55.6	06.8	106	105.2	12.9	156	154.8	19.0	206	204.5	25.1	256	254.1	31.2
7	06.9	00.9	57	56.6	06.9	07	106.2	13.0	57	155.8	19.1	07	205.4	25.2	57	255.1	31.3
8	07.9	01.0	58	57.6	07.1	08	107.2	13.1	58	156.8	19.2	08	206.4	25.3	58	256.1	31.4
9	08.9	01.1	59	58.6	07.2	09	108.2	13.3	59	157.8	19.4	09	207.4	25.4	59	257.1	31.5
10	09.9	01.2	60	59.6	07.3	10	109.2	13.4	60	158.8	19.5	10	208.4	25.6	60	258.1	31.7
11	10.9	01.3	61	60.5	07.4	111	110.2	13.5	161	159.8	19.6	211	209.4	25.7	261	259.0	31.8
12	11.9	01.5	62	61.5	07.5	12	111.2	13.6	62	160.8	19.7	12	210.4	25.8	62	260.0	31.9
13	12.9	01.6	63	62.5	07.7	13	112.1	13.8	63	161.8	19.8	13	211.4	25.9	63	261.0	32.0
14	13.9	01.7	64	63.5	07.8	14	113.1	13.9	64	162.8	20.0	14	212.4	26.1	64	262.0	32.1
15	14.9	01.8	65	64.5	07.9	15	114.1	14.0	65	163.8	20.1	15	213.4	26.2	65	263.0	32.3
16	15.9	01.9	66	65.5	08.0	116	115.1	14.1	66	164.8	20.2	216	214.4	26.3	266	264.0	32.4
17	16.9	02.1	67	66.5	08.2	17	116.1	14.2	67	165.7	20.3	17	215.4	26.4	67	265.0	32.5
18	17.9	02.2	68	67.5	08.3	18	117.1	14.4	68	166.7	20.5	18	216.4	26.5	68	266.0	32.6
19	18.9	02.3	69	68.5	08.4	19	118.1	14.5	69	167.7	20.6	19	217.4	26.7	69	267.0	32.8
20	19.9	02.4	70	69.5	08.5	20	119.1	14.6	70	168.7	20.7	20	218.4	26.8	70	268.0	32.9
21	20.8	02.6	71	70.5	08.6	121	120.1	14.7	171	169.7	20.8	221	219.3	26.9	271	269.0	33.0
22	21.8	02.7	72	71.5	08.8	22	121.1	14.9	72	170.7	20.9	22	220.3	27.0	72	270.0	33.1
23	22.8	02.8	73	72.5	08.9	23	122.1	15.0	73	171.7	21.1	23	221.3	27.2	73	271.0	33.2
24	23.8	02.9	74	73.4	09.0	24	123.1	15.1	74	172.7	21.2	24	222.3	27.3	74	272.0	33.4
25	24.8	03.0	75	74.4	09.1	25	124.1	15.2	75	173.7	21.3	25	223.3	27.4	75	273.0	33.5
26	25.8	03.2	76	75.4	09.3	126	125.1	15.3	176	174.7	21.4	226	224.3	27.5	276	273.9	33.6
27	26.8	03.3	77	76.4	09.4	27	126.0	15.5	77	175.7	21.6	27	225.3	27.6	77	274.9	33.7
28	27.8	03.4	78	77.4	09.5	28	127.0	15.6	78	176.7	21.7	28	226.3	27.8	78	275.9	33.9
29	28.8	03.5	79	78.4	09.6	29	128.0	15.7	79	177.7	21.8	29	227.3	27.9	79	276.9	34.0
30	29.8	03.7	80	79.4	09.7	30	129.0	15.8	80	178.7	21.9	30	228.3	28.0	80	277.9	34.1
31	30.8	03.8	81	80.4	09.9	131	130.0	16.0	181	179.6	22.0	231	229.3	28.1	281	278.9	34.2
32	31.8	03.9	82	81.4	10.0	32	131.0	16.1	82	180.6	22.2	32	230.3	28.3	82	279.9	34.3
33	32.8	04.0	83	82.4	10.1	33	132.0	16.2	83	181.6	22.3	33	231.3	28.4	83	280.9	34.5
34	33.7	04.1	84	83.4	10.2	34	133.0	16.3	84	182.6	22.4	34	232.2	28.5	84	281.9	34.6
35	34.7	04.3	85	84.4	10.4	35	134.0	16.4	85	183.6	22.5	35	233.2	28.6	85	282.9	34.7
36	35.7	04.4	86	85.4	10.5	136	135.0	16.6	186	184.6	22.7	236	234.2	28.7	286	283.9	34.8
37	36.7	04.5	87	86.3	10.6	37	136.0	16.7	87	185.6	22.8	37	235.2	28.9	87	284.8	34.9
38	37.7	04.6	88	87.3	10.7	38	137.0	16.8	88	186.6	22.9	38	236.2	29.0	88	285.8	35.1
39	38.7	04.8	89	88.3	10.8	39	138.0	16.9	89	187.6	23.0	39	237.2	29.1	89	286.8	35.2
40	39.7	04.9	90	89.3	11.0	40	139.0	17.1	90	188.6	23.1	40	238.2	29.2	90	287.8	35.3
41	40.7	05.0	91	90.3	11.1	141	139.9	17.2	191	189.6	23.3	241	239.2	29.3	291	288.8	35.4
42	41.7	05.1	92	91.3	11.2	42	140.9	17.3	92	190.6	23.4	42	240.2	29.5	92	289.8	35.5
43	42.7	05.2	93	92.3	11.3	43	141.9	17.4	93	191.6	23.5	43	241.2	29.6	93	290.8	35.7
44	43.7	05.4	94	93.3	11.5	44	142.9	17.5	94	192.5	23.6	44	242.2	29.7	94	291.8	35.8
45	44.7	05.5	95	94.3	11.6	45	143.9	17.7	95	193.5	23.7	45	243.2	29.8	95	292.8	35.9
46	45.7	05.6	96	95.3	11.7	146	144.9	17.8	196	194.5	23.9	246	244.2	29.9	296	293.8	36.0
47	46.6	05.7	97	96.3	11.8	47	145.9	17.9	97	195.5	24.0	47	245.1	30.1	97	294.8	36.2
48	47.6	05.8	98	97.3	11.9	48	146.9	18.0	98	196.5	24.1	48	246.1	30.2	98	295.8	36.3
49	48.6	05.9	99	98.3	12.1	49	147.9	18.1	99	197.5	24.2	49	247.1	30.3	99	296.8	36.4
50	49.6	06.1	100	99.3	12.2	150	148.9	18.3	200	198.5	24.3	250	248.1	30.4	300	297.8	36.5
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 83 Deg.

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	01.0	00.1	51	50.5	07.1	101	100.0	14.1	151	149.5	21.0	201	199.1	28.0	251	248.6	34.9
2	02.0	00.3	52	51.5	07.2	02	101.0	14.2	52	150.5	21.2	02	200.0	28.1	52	249.6	35.1
3	03.0	00.4	53	52.5	07.4	03	102.0	14.3	53	151.5	21.3	03	201.0	28.3	53	250.5	35.2
4	04.0	00.6	54	53.5	07.5	04	103.0	14.5	54	152.5	21.4	04	202.0	28.4	54	251.5	35.4
5	05.0	00.7	55	54.5	07.7	05	104.0	14.6	55	153.5	21.6	05	203.0	28.5	55	252.5	35.5
6	05.9	00.8	56	55.5	07.8	106	105.0	14.8	156	154.5	21.7	206	204.0	28.7	256	253.5	35.6
7	06.9	01.0	57	56.4	07.9	07	106.0	14.9	57	155.5	21.9	07	205.0	28.8	57	254.5	35.8
8	07.9	01.1	58	57.4	08.1	08	107.0	15.0	58	156.5	22.0	08	206.0	29.0	58	255.5	35.9
9	08.9	01.3	59	58.4	08.2	09	107.9	15.2	59	157.5	22.1	09	207.0	29.1	59	256.5	36.1
10	09.9	01.4	60	59.4	08.4	10	108.9	15.3	60	158.4	22.3	10	208.0	29.2	60	257.5	36.2
11	10.9	01.5	61	60.4	08.5	111	109.9	15.5	161	159.4	22.4	211	209.0	29.4	261	258.5	36.3
12	11.9	01.7	62	61.4	08.6	12	110.9	15.6	62	160.4	22.6	12	209.9	29.5	62	259.5	36.5
13	12.9	01.8	63	62.4	08.8	13	111.9	15.7	63	161.4	22.7	13	210.9	29.6	63	260.4	36.6
14	13.9	01.9	64	63.4	08.9	14	112.9	15.9	64	162.4	22.8	14	211.9	29.8	64	261.4	36.7
15	14.9	02.1	65	64.4	09.0	15	113.9	16.0	65	163.4	23.0	15	212.9	29.9	65	262.4	36.9
16	15.8	02.2	66	65.4	09.2	116	114.9	16.1	66	164.4	23.1	216	213.9	30.1	266	263.4	37.0
17	16.8	02.4	67	66.4	09.3	17	115.9	16.3	67	165.4	23.2	17	214.9	30.2	67	264.4	37.2
18	17.8	02.5	68	67.3	09.5	18	116.9	16.4	68	166.4	23.4	18	215.9	30.3	68	265.4	37.3
19	18.8	02.6	69	68.3	09.6	19	117.8	16.6	69	167.4	23.5	19	216.9	30.5	69	266.4	37.4
20	19.8	02.8	70	69.3	09.7	20	118.8	16.7	70	168.4	23.7	20	217.9	30.6	70	267.4	37.6
21	20.8	02.9	71	70.3	09.9	21	119.8	16.8	71	169.4	23.8	221	218.9	30.8	271	268.4	37.7
22	21.8	03.1	72	71.3	10.0	22	120.8	17.0	72	170.3	23.9	22	219.8	30.9	72	269.4	37.9
23	22.8	03.2	73	72.3	10.2	23	121.8	17.1	73	171.3	24.1	23	220.8	31.0	73	270.4	38.0
24	23.8	03.3	74	73.3	10.3	24	122.8	17.3	74	172.3	24.2	24	221.8	31.2	74	271.3	38.1
25	24.8	03.5	75	74.3	10.4	25	123.8	17.4	75	173.3	24.4	25	222.8	31.3	75	272.3	38.3
26	25.7	03.6	76	75.3	10.6	26	124.8	17.5	76	174.3	24.5	226	223.8	31.5	276	273.3	38.4
27	26.7	03.8	77	76.3	10.7	27	125.8	17.7	77	175.3	24.6	27	224.8	31.6	77	274.3	38.6
28	27.7	03.9	78	77.2	10.9	28	126.8	17.8	78	176.3	24.8	28	225.8	31.7	78	275.3	38.7
29	28.7	04.0	79	78.2	11.0	29	127.7	18.0	79	177.3	24.9	29	226.8	31.9	79	276.3	38.8
30	29.7	04.2	80	79.2	11.1	30	128.7	18.1	80	178.3	25.1	30	227.8	32.0	80	277.3	39.0
31	30.7	04.3	81	80.2	11.3	31	129.7	18.2	81	179.2	25.2	31	228.8	32.2	81	278.3	39.1
32	31.7	04.5	82	81.2	11.4	32	130.7	18.4	82	180.2	25.3	32	229.7	32.3	82	279.3	39.3
33	32.7	04.6	83	82.2	11.6	33	131.7	18.5	83	181.2	25.5	33	230.7	32.4	83	280.3	39.4
34	33.7	04.7	84	83.2	11.7	34	132.7	18.7	84	182.2	25.6	34	231.7	32.6	84	281.2	39.5
35	34.7	04.9	85	84.2	11.8	35	133.7	18.8	85	183.2	25.8	35	232.7	32.7	85	282.2	39.7
36	35.7	05.0	86	85.2	12.0	36	134.7	18.9	86	184.2	25.9	36	233.7	32.9	86	283.2	39.8
37	36.6	05.2	87	86.2	12.1	37	135.7	19.1	87	185.2	26.0	37	234.7	33.0	87	284.2	40.0
38	37.6	05.3	88	87.1	12.2	38	136.7	19.2	88	186.2	26.2	38	235.7	33.1	88	285.2	40.1
39	38.6	05.4	89	88.1	12.4	39	137.7	19.3	89	187.2	26.3	39	236.7	33.3	89	286.2	40.2
40	39.6	05.6	90	89.1	12.5	40	138.6	19.5	90	188.2	26.4	40	237.7	33.4	90	287.2	40.4
41	40.6	05.7	91	90.1	12.7	41	139.6	19.6	91	189.1	26.6	41	238.7	33.5	91	288.2	40.5
42	41.6	05.8	92	91.1	12.8	42	140.6	19.8	92	190.1	26.7	42	239.7	33.7	92	289.2	40.6
43	42.6	06.0	93	92.1	12.9	43	141.6	19.9	93	191.1	26.9	43	240.6	33.8	93	290.2	40.8
44	43.6	06.1	94	93.1	13.1	44	142.6	20.0	94	192.1	27.0	44	241.6	34.0	94	291.1	40.9
45	44.6	06.3	95	94.1	13.2	45	143.6	20.2	95	193.1	27.1	45	242.6	34.1	95	292.1	41.1
46	45.6	06.4	96	95.1	13.4	46	144.6	20.3	96	194.1	27.3	46	243.6	34.2	96	293.1	41.2
47	46.5	06.5	97	96.1	13.5	47	145.6	20.5	97	195.1	27.4	47	244.6	34.4	97	294.1	41.3
48	47.5	06.7	98	97.0	13.6	48	146.6	20.6	98	196.1	27.6	48	245.6	34.5	98	295.1	41.5
49	48.5	06.8	99	98.0	13.8	49	147.6	20.7	99	197.1	27.7	49	246.6	34.7	99	296.1	41.6
50	49.5	07.0	100	99.0	13.9	50	148.5	20.9	200	198.1	27.8	250	247.6	34.8	300	297.1	41.8
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 82 Deg.

Difference of Latitude and Departure for 9 Deg.

9

Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep
1	01.0	00.2	51	50.4	08.0	101	99.8	15.8	151	149.1	23.6	201	198.5	31.4	251	247.9	39.3
2	02.0	00.3	52	51.4	08.1	02	100.7	16.0	52	150.1	23.8	02	199.5	31.6	52	248.9	39.4
3	03.0	00.5	53	52.3	08.3	03	101.7	16.1	53	151.1	23.9	03	200.5	31.7	53	249.9	39.6
4	04.0	00.6	54	53.3	08.4	04	102.7	16.3	54	152.1	24.1	04	201.5	31.9	54	250.9	39.7
5	04.9	00.8	55	54.3	08.6	05	103.7	16.4	55	153.1	24.2	05	202.5	32.1	55	251.9	39.9
6	05.9	00.9	56	55.3	08.8	106	104.7	16.6	156	154.1	24.4	206	203.5	32.2	256	252.9	40.0
7	06.9	01.1	57	56.3	08.9	07	105.7	16.7	57	155.1	24.6	07	204.5	32.4	57	253.8	40.2
8	07.9	01.3	58	57.3	09.1	08	106.7	16.9	58	156.1	24.7	08	205.4	32.5	58	254.8	40.4
9	08.9	01.4	59	58.3	09.2	09	107.7	17.0	59	157.0	24.9	09	206.4	32.7	59	255.8	40.5
10	09.9	01.6	60	59.3	09.4	10	108.6	17.2	60	158.0	25.0	10	207.4	32.8	60	256.8	40.7
11	10.9	01.7	61	60.2	09.5	111	109.6	17.4	161	159.0	25.2	211	208.4	33.0	261	257.8	40.8
12	11.9	01.9	62	61.2	09.7	12	110.6	17.5	62	160.0	25.3	12	209.4	33.2	62	258.8	41.0
13	12.8	02.0	63	62.2	09.9	13	111.6	17.7	63	161.0	25.5	13	210.4	33.3	63	259.8	41.1
14	13.8	02.2	64	63.2	10.0	14	112.6	17.8	64	162.0	25.6	14	211.4	33.5	64	260.8	41.3
15	14.8	02.3	65	64.2	10.2	15	113.6	18.0	65	163.0	25.8	15	212.4	33.6	65	261.7	41.4
16	15.8	02.5	66	65.2	10.3	116	114.6	18.1	66	164.0	26.0	216	213.3	33.8	266	262.7	41.6
17	16.8	02.7	67	66.2	10.5	17	115.6	18.3	67	164.9	26.1	17	214.3	33.9	67	263.7	41.8
18	17.8	02.8	68	67.2	10.6	18	116.5	18.5	68	165.9	26.3	18	215.3	34.1	68	264.7	41.9
19	18.8	03.0	69	68.2	10.8	19	117.5	18.6	69	166.9	26.4	19	216.3	34.3	69	265.7	42.1
20	19.8	03.1	70	69.1	10.9	20	118.5	18.8	70	167.9	26.6	20	217.3	34.4	70	266.7	42.2
21	20.7	03.3	71	70.1	11.1	121	119.5	18.9	171	168.9	26.7	221	218.3	34.6	271	267.7	42.4
22	21.7	03.4	72	71.1	11.3	22	120.5	19.1	72	169.9	26.9	22	219.3	34.7	72	268.7	42.5
23	22.7	03.6	73	72.1	11.4	23	121.5	19.2	73	170.9	27.1	23	220.3	34.9	73	269.6	42.7
24	23.7	03.8	74	73.1	11.6	24	122.5	19.4	74	171.9	27.2	24	221.2	35.0	74	270.6	42.9
25	24.7	03.9	75	74.1	11.7	25	123.5	19.6	75	172.8	27.4	25	222.2	35.2	75	271.6	43.0
26	25.7	04.1	76	75.1	11.9	126	124.5	19.7	176	173.8	27.5	226	223.2	35.3	276	272.6	43.2
27	26.7	04.2	77	76.1	12.0	27	125.4	19.9	77	174.8	27.7	27	224.2	35.5	77	273.6	43.3
28	27.7	04.4	78	77.0	12.2	28	126.4	20.0	78	175.8	27.8	28	225.2	35.7	78	274.6	43.5
29	28.6	04.5	79	78.0	12.4	29	127.4	20.2	79	176.8	28.0	29	226.2	35.8	79	275.6	43.6
30	29.6	04.7	80	79.0	12.5	30	128.4	20.3	80	177.8	28.2	30	227.2	36.0	80	276.6	43.8
31	30.6	04.8	81	80.0	12.7	131	129.4	20.5	181	178.8	28.3	231	228.2	36.1	281	277.5	43.9
32	31.6	05.0	82	81.0	12.8	32	130.4	20.6	82	179.8	28.5	32	229.1	36.3	82	278.5	44.1
33	32.6	05.2	83	82.0	13.0	33	131.4	20.8	83	180.7	28.6	33	230.1	36.4	83	279.5	44.3
34	33.6	05.3	84	83.0	13.1	34	132.4	21.0	84	181.7	28.8	34	231.1	36.6	84	280.5	44.4
35	34.6	05.5	85	84.0	13.3	35	133.3	21.1	85	182.7	28.9	35	232.1	36.8	85	281.5	44.6
36	35.6	05.6	86	84.9	13.5	136	134.3	21.3	186	183.7	29.1	236	233.1	36.9	286	282.5	44.7
37	36.5	05.8	87	85.9	13.6	37	135.3	21.4	87	184.7	29.2	37	234.1	37.1	87	283.5	44.9
38	37.5	05.9	88	86.9	13.8	38	136.3	21.6	88	185.7	29.4	38	235.1	37.2	88	284.5	45.0
39	38.5	06.1	89	87.9	13.9	39	137.3	21.7	89	186.7	29.6	39	236.1	37.4	89	285.4	45.2
40	39.5	06.3	90	88.9	14.1	40	138.3	21.9	90	187.7	29.7	40	237.0	37.5	90	286.4	45.4
41	40.5	06.4	91	89.9	14.2	141	139.3	22.1	191	188.7	29.9	241	238.0	37.7	291	287.4	45.5
42	41.5	06.6	92	90.9	14.4	42	140.3	22.2	92	189.6	30.0	42	239.0	37.8	92	288.4	45.7
43	42.5	06.7	93	91.9	14.5	43	141.2	22.4	93	190.6	30.2	43	240.0	38.0	93	289.4	45.8
44	43.5	06.9	94	92.8	14.7	44	142.2	22.5	94	191.6	30.3	44	241.0	38.2	94	290.4	46.0
45	44.4	07.0	95	93.8	14.9	45	143.2	22.7	95	192.6	30.5	45	242.0	38.3	95	291.4	46.1
46	45.4	07.2	96	94.8	15.0	146	144.2	22.8	196	193.6	30.7	246	243.0	38.5	296	292.4	46.3
47	46.4	07.4	97	95.8	15.2	47	145.2	23.0	97	194.6	30.8	47	244.0	38.6	97	293.3	46.5
48	47.4	07.5	98	96.8	15.3	48	146.2	23.1	98	195.6	31.0	48	244.9	38.8	98	294.3	46.6
49	48.4	07.7	99	97.8	15.5	49	147.2	23.3	99	196.6	31.1	49	245.9	38.9	99	295.3	46.8
50	49.4	07.8	100	98.8	15.6	150	148.2	23.5	200	197.5	31.3	250	246.9	39.1	300	296.3	46.9
Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat

for 81 Deg

10 Difference of Latitude and Departure for 10 Deg.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.2	51	50.2	08.8	101	99.5	17.5	151	148.7	26.2	201	197.9	34.9	251	247.2	43.5
2	02.0	00.3	52	51.2	09.0	02	100.4	17.7	52	149.7	26.4	02	198.9	35.0	52	248.2	43.7
3	03.0	00.5	53	52.2	09.2	03	101.4	17.9	53	150.7	26.5	03	199.9	35.2	53	249.2	43.9
4	03.9	00.7	54	53.2	09.4	04	102.4	18.0	54	151.7	26.7	04	200.9	35.4	54	250.1	44.0
5	04.9	00.9	55	54.2	09.5	05	103.4	18.2	55	152.6	26.9	05	201.9	35.5	55	251.1	44.2
6	05.9	01.0	56	55.1	09.7	106	104.4	18.4	156	153.6	27.1	206	202.9	35.7	256	252.1	44.4
7	06.9	01.2	57	56.1	09.9	07	105.4	18.6	57	154.6	27.2	07	203.9	35.9	57	253.1	44.6
8	07.9	01.4	58	57.1	10.1	08	106.4	18.7	58	155.6	27.4	08	204.8	36.1	58	254.1	44.7
9	08.9	01.6	59	58.1	10.2	09	107.3	18.9	59	156.6	27.6	09	205.8	36.2	59	255.1	44.9
10	09.8	01.7	60	59.1	10.4	10	108.3	19.1	60	157.6	27.7	10	206.8	36.4	60	256.0	45.1
11	10.8	01.9	61	60.1	10.6	111	109.3	19.2	161	158.6	27.9	211	207.8	36.6	261	257.0	45.3
12	11.8	02.1	62	61.1	10.8	12	110.3	19.4	62	159.5	28.1	12	208.8	36.8	62	258.0	45.4
13	12.8	02.3	63	62.0	10.9	13	111.3	19.6	63	160.5	28.3	13	209.8	36.9	63	259.0	45.6
14	13.8	02.4	64	63.0	11.1	14	112.3	19.8	64	161.5	28.4	14	210.7	37.1	64	260.0	45.8
15	14.8	02.6	65	64.0	11.2	15	113.3	19.9	65	162.5	28.6	15	211.7	37.3	65	261.0	46.0
16	15.8	02.8	66	65.0	11.4	116	114.2	20.1	66	163.5	28.8	216	212.7	37.5	266	262.0	46.1
17	16.7	02.9	67	66.0	11.6	17	115.2	20.3	67	164.5	29.0	17	213.7	37.6	67	262.9	46.3
18	17.7	03.1	68	67.0	11.8	18	116.2	20.5	68	165.4	29.1	18	214.7	37.8	68	263.9	46.5
19	18.7	03.3	69	68.0	12.0	19	117.2	20.6	69	166.4	29.3	19	215.7	38.0	69	264.9	46.6
20	19.7	03.5	70	68.9	12.1	20	118.2	20.8	70	167.4	29.5	20	216.7	38.1	70	265.9	46.8
21	20.7	03.6	71	69.9	12.3	21	119.2	21.0	71	168.4	29.7	221	217.6	38.3	271	266.9	47.0
22	21.7	03.8	72	70.9	12.5	22	120.1	21.2	72	169.4	29.8	22	218.6	38.5	72	267.9	47.2
23	22.7	04.0	73	71.9	12.7	23	121.1	21.3	73	170.4	30.0	23	219.6	38.7	73	268.8	47.3
24	23.6	04.2	74	72.9	12.8	24	122.1	21.5	74	171.4	30.2	24	220.6	38.8	74	269.8	47.5
25	24.6	04.3	75	73.9	13.0	25	123.1	21.7	75	172.3	30.3	25	221.6	39.0	75	270.8	47.7
26	25.6	04.5	76	74.8	13.2	26	124.1	21.8	76	173.3	30.5	226	222.6	39.2	276	271.8	47.9
27	26.6	04.7	77	75.8	13.4	27	125.1	22.0	77	174.3	30.7	27	223.5	39.4	77	272.8	48.0
28	27.6	04.9	78	76.8	13.5	28	126.1	22.2	78	175.3	30.9	28	224.5	39.5	78	273.8	48.2
29	28.6	05.0	79	77.8	13.7	29	127.0	22.4	79	176.3	31.0	29	225.5	39.7	79	274.8	48.4
30	29.5	05.2	80	78.8	13.9	30	128.0	22.5	80	177.3	31.2	30	226.5	39.9	80	275.7	48.6
31	30.5	05.4	81	79.8	14.0	31	129.0	22.7	181	178.2	31.4	231	227.5	40.1	281	276.7	48.7
32	31.5	05.5	82	80.8	14.2	32	130.0	22.9	82	179.2	31.6	32	228.5	40.2	82	277.7	48.9
33	32.5	05.7	83	81.7	14.4	33	131.0	23.1	83	180.2	31.7	33	229.5	40.4	83	278.7	49.1
34	33.5	05.9	84	82.7	14.6	34	132.0	23.2	84	181.2	31.9	34	230.4	40.6	84	279.7	49.2
35	34.5	06.1	85	83.7	14.7	35	132.9	23.4	85	182.2	31.1	35	231.4	40.7	85	280.7	49.4
36	35.5	06.2	86	84.7	14.9	36	133.9	23.6	186	183.2	32.3	236	232.4	40.9	286	281.6	49.6
37	36.4	06.4	87	85.7	15.1	37	134.9	23.8	87	184.2	32.4	37	233.4	41.1	87	282.6	49.8
38	37.4	06.6	88	86.7	15.3	38	135.9	23.9	88	185.1	32.6	38	234.4	41.3	88	283.6	49.9
39	38.4	06.8	89	87.6	15.4	39	136.9	24.1	89	186.1	32.8	39	235.4	41.4	89	284.6	50.1
40	39.4	06.9	90	88.6	15.6	40	137.9	24.3	90	187.1	32.9	40	236.3	41.6	90	285.6	50.3
41	40.4	07.1	91	89.6	15.8	41	138.9	24.4	191	188.1	33.1	241	237.3	41.8	291	286.6	50.5
42	41.4	07.3	92	90.6	16.0	42	139.8	24.6	92	189.1	33.3	42	238.3	42.0	92	287.6	50.6
43	42.3	07.5	93	91.6	16.1	43	140.8	24.8	93	190.1	33.5	43	239.3	42.1	93	288.5	50.8
44	43.3	07.6	94	92.6	16.3	44	141.8	25.0	94	191.0	33.6	44	240.3	42.3	94	289.5	51.0
45	44.3	07.8	95	93.6	16.5	45	142.8	25.1	95	192.0	33.8	45	241.3	42.5	95	290.5	51.2
46	45.3	08.0	96	94.5	16.6	46	143.8	25.3	196	193.0	34.0	246	242.3	42.7	296	291.5	51.3
47	46.3	08.1	97	95.5	16.8	47	144.8	25.5	97	194.0	34.2	47	243.2	42.8	97	292.5	51.5
48	47.3	08.3	98	96.5	17.0	48	145.7	25.7	98	195.0	34.3	48	244.2	43.0	98	293.5	51.7
49	48.3	08.5	99	97.5	17.2	49	146.7	25.8	99	196.0	34.5	49	245.2	43.2	99	294.5	51.8
50	49.2	08.7	100	98.5	17.3	50	147.7	26.0	200	197.0	34.7	250	246.2	43.4	300	295.4	52.0
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 80 Deg.

Difference of Latitude and Departure for 11 Deg. 11

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.2	51	50.1	09.7	101	99.1	19.3	151	148.2	28.8	201	197.3	38.4	251	246.4	47.9
2	02.0	00.4	52	51.0	09.9	02	100.1	19.5	52	149.2	29.0	02	198.3	38.5	52	247.4	48.1
3	02.9	00.6	53	52.0	10.1	03	101.1	19.7	53	150.2	29.2	03	199.3	38.7	53	248.3	48.3
4	03.9	00.8	54	53.0	10.3	04	102.1	19.8	54	151.2	29.4	04	200.2	38.9	54	249.3	48.5
5	04.9	01.0	55	54.0	10.5	05	103.1	20.0	55	152.1	29.6	05	201.2	39.1	55	250.3	48.7
6	05.9	01.1	56	55.0	10.7	106	104.0	20.2	156	153.1	29.8	206	202.2	39.3	256	251.3	48.8
7	06.9	01.3	57	56.0	10.9	07	105.0	20.4	57	154.1	30.0	07	203.2	39.5	57	252.3	49.0
8	07.9	01.5	58	56.9	11.1	08	106.0	20.6	58	155.1	30.1	08	204.2	39.7	58	253.2	49.2
9	08.8	01.7	59	57.9	11.3	09	107.0	20.8	59	156.1	30.3	09	205.2	39.9	59	254.2	49.4
10	09.8	01.9	60	58.9	11.4	10	108.0	21.0	60	157.1	30.5	10	206.1	40.0	60	255.2	49.6
11	10.8	02.1	61	59.9	11.6	111	109.0	21.2	161	158.0	30.7	211	207.1	40.3	261	256.2	49.8
12	11.8	02.3	62	60.9	11.8	12	109.9	21.4	62	159.0	30.9	12	208.1	40.4	62	257.2	50.0
13	12.8	02.5	63	61.8	12.0	13	110.9	21.6	63	160.0	31.1	13	209.1	40.6	63	258.2	50.2
14	13.7	02.7	64	62.8	12.2	14	111.9	21.8	64	161.0	31.3	14	210.1	40.8	64	259.1	50.4
15	14.7	02.9	65	63.8	12.4	15	112.9	21.9	65	162.0	31.5	15	211.0	41.0	65	260.1	50.6
16	15.7	03.1	66	64.8	12.6	116	113.9	22.1	166	162.9	31.7	216	212.0	41.2	266	261.1	50.8
17	16.7	03.2	67	65.8	12.8	17	114.8	22.3	67	163.9	31.9	17	213.0	41.4	67	262.1	50.9
18	17.7	03.4	68	66.7	13.0	18	115.8	22.5	68	164.9	32.1	18	214.0	41.6	68	263.1	51.1
19	18.7	03.6	69	67.7	13.2	19	116.8	22.7	69	165.9	32.2	19	215.0	41.8	69	264.0	51.3
20	19.6	03.8	70	68.7	13.4	20	117.8	22.9	70	166.9	32.4	20	215.9	42.0	70	265.0	51.5
21	20.6	04.0	71	69.7	13.5	121	118.8	23.1	171	167.9	32.6	221	216.9	42.2	271	266.0	51.7
22	21.6	04.2	72	70.7	13.7	22	119.8	23.3	72	168.8	32.8	22	217.9	42.4	72	267.0	51.9
23	22.6	04.4	73	71.7	13.9	23	120.7	23.5	73	169.8	33.0	23	218.9	42.5	73	268.0	52.1
24	23.6	04.6	74	72.6	14.1	24	121.7	23.7	74	170.8	33.2	24	219.9	42.7	74	269.9	52.3
25	24.5	04.8	75	73.6	14.3	25	122.7	23.9	75	171.8	33.4	25	220.9	42.9	75	269.9	52.5
26	25.5	05.0	76	74.6	14.5	126	123.7	24.0	176	172.8	33.6	226	221.8	43.1	276	270.9	52.7
27	26.5	05.2	77	75.6	14.7	27	124.7	24.2	77	173.7	33.8	27	222.8	43.3	77	271.9	52.9
28	27.5	05.3	78	76.6	14.9	28	125.6	24.4	78	174.7	34.0	28	223.8	43.5	78	272.9	53.0
29	28.5	05.5	79	77.5	15.1	29	126.6	24.6	79	175.7	34.2	29	224.8	43.7	79	273.9	53.2
30	29.4	05.7	80	78.5	15.3	30	127.6	24.8	80	176.7	34.3	30	225.8	43.9	80	274.8	53.4
31	30.4	05.9	81	79.5	15.5	131	128.6	25.0	181	177.7	34.5	231	226.7	44.1	281	275.8	53.6
32	31.4	06.1	82	80.5	15.6	32	129.6	25.2	82	178.6	34.7	32	227.7	44.3	82	276.8	53.8
33	32.4	06.3	83	81.5	15.8	33	130.6	25.4	83	179.6	34.9	33	228.7	44.5	83	277.8	54.0
34	33.4	06.5	84	82.5	16.0	34	131.5	25.6	84	180.6	35.1	34	229.7	44.6	84	278.8	54.2
35	34.4	06.7	85	83.4	16.2	35	132.5	25.8	85	181.6	35.3	35	230.7	44.8	85	279.8	54.4
36	35.3	06.9	86	84.4	16.4	136	133.5	25.9	186	182.6	35.5	236	231.7	45.0	286	280.7	54.6
37	36.3	07.1	87	85.4	16.6	37	134.5	26.1	87	183.6	35.7	37	232.6	45.2	87	281.7	54.8
38	37.3	07.3	88	86.4	16.8	38	135.5	26.3	88	184.5	35.9	38	233.6	45.4	88	282.7	55.0
39	38.3	07.4	89	87.4	17.0	39	136.4	26.5	89	185.5	36.1	39	234.6	45.6	89	283.7	45.1
40	39.3	07.6	90	88.3	17.2	40	137.4	26.7	90	186.5	36.3	40	235.6	45.8	90	284.7	55.3
41	40.2	07.8	91	89.3	17.4	141	138.4	26.9	191	187.5	36.4	241	236.6	46.0	291	285.6	55.5
42	41.2	08.0	92	90.3	17.6	42	139.4	27.1	92	188.5	36.6	42	237.5	46.2	92	286.6	55.7
43	42.2	08.2	93	91.3	17.7	43	140.4	27.3	93	189.4	36.8	43	238.5	46.4	93	287.6	55.9
44	43.2	08.4	94	92.3	17.9	44	141.3	27.5	94	190.4	37.0	44	239.5	46.6	94	288.6	56.1
45	44.2	08.6	95	93.3	18.1	45	142.3	27.7	95	191.4	37.2	45	240.5	46.7	95	289.6	56.3
46	45.2	08.8	96	94.2	18.3	146	143.3	27.9	196	192.4	37.4	246	241.5	47.0	296	290.5	56.5
47	46.1	09.0	97	95.2	18.5	47	144.3	28.0	97	193.4	37.6	47	242.5	47.1	97	291.5	56.7
48	47.1	09.2	98	96.2	18.7	48	145.3	28.2	98	194.4	37.8	48	243.4	47.3	98	292.5	56.9
49	48.1	09.3	99	97.2	18.9	49	146.3	28.4	99	195.3	38.0	49	244.4	47.5	99	293.5	57.0
50	49.1	09.5	100	98.2	19.1	150	147.2	28.6	200	196.3	38.2	250	245.4	47.7	300	294.5	57.2
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 79 Deg

12 Difference of Latitude and Departure for 12 Deg.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.2	51	49.9	10.6	101	98.8	21.0	151	147.7	31.4	201	196.6	41.8	251	245.5	52.2
2	02.0	00.4	52	50.9	10.8	02	99.8	21.2	52	148.7	31.6	02	197.6	42.0	52	246.5	52.4
3	02.9	00.6	53	51.8	11.0	03	100.7	21.4	53	149.6	31.8	03	198.5	42.2	53	247.4	52.6
4	03.9	00.8	54	52.8	11.2	04	101.7	21.6	54	150.6	32.0	04	199.5	42.4	54	248.4	52.8
5	04.9	01.0	55	53.8	11.4	05	102.7	21.8	55	151.6	32.2	05	200.5	42.6	55	249.4	53.0
6	05.9	01.2	56	54.8	11.6	06	103.7	22.0	156	152.6	32.4	206	201.5	42.8	256	250.4	53.2
7	06.8	01.5	57	55.7	11.9	07	104.6	22.3	57	153.5	32.7	07	202.4	43.1	57	251.3	53.5
8	07.8	01.7	58	56.7	12.1	08	105.6	22.5	58	154.5	32.9	08	203.4	43.3	58	252.3	53.7
9	08.8	01.9	59	57.7	12.3	09	106.6	22.7	59	155.5	33.1	09	204.4	43.5	59	253.3	53.9
10	09.8	02.1	60	58.7	12.5	10	107.6	22.9	60	156.5	33.3	10	205.4	43.7	60	254.3	54.1
11	10.8	02.3	61	59.7	12.7	11	108.6	23.1	161	157.5	33.5	211	206.4	43.9	261	255.3	54.3
12	11.7	02.5	62	60.6	12.9	12	109.5	23.3	62	158.4	33.7	12	207.3	44.1	62	256.2	54.5
13	12.7	02.7	63	61.6	13.1	13	110.5	23.5	63	159.4	33.9	13	208.3	44.3	63	257.2	54.7
14	13.7	02.9	64	62.6	13.3	14	111.5	23.7	64	160.4	34.1	14	209.3	44.5	64	258.2	54.9
15	14.7	03.1	65	63.6	13.5	15	112.5	23.9	65	161.4	34.3	15	210.3	44.7	65	259.2	55.1
16	15.6	03.3	66	64.5	13.7	116	113.4	24.1	166	162.3	34.5	216	211.2	44.9	266	260.1	45.3
17	16.6	03.5	67	65.5	13.9	17	114.4	24.3	67	163.3	34.7	17	212.2	45.1	67	261.1	55.5
18	17.6	03.7	68	66.5	14.1	18	115.4	24.5	68	164.3	34.9	18	213.2	45.3	68	262.1	55.7
19	18.6	04.0	69	67.5	14.4	19	116.4	24.8	69	165.3	35.2	19	214.2	45.6	69	263.1	56.0
20	19.6	04.2	70	68.5	14.6	20	117.4	25.0	70	166.3	35.4	20	215.2	45.8	70	264.1	56.2
21	20.5	04.4	71	69.4	14.8	121	118.3	25.2	171	167.2	35.6	221	216.1	46.0	271	265.1	56.4
22	21.5	04.6	72	70.4	15.0	22	119.3	25.4	72	168.2	35.8	22	217.1	46.2	72	266.0	56.6
23	22.5	04.8	73	71.4	15.2	23	120.3	25.6	73	169.2	36.0	23	218.1	46.4	73	267.0	56.8
24	23.5	05.0	74	72.4	15.4	24	121.3	25.8	74	170.2	36.2	24	219.1	46.6	74	268.0	57.0
25	24.5	05.2	75	73.4	15.6	25	122.3	26.0	75	171.2	36.4	25	220.1	46.8	75	269.0	57.2
26	25.4	05.4	76	74.3	15.8	126	123.2	26.2	176	172.1	36.6	226	221.0	47.0	276	269.9	57.4
27	26.4	05.6	77	75.3	16.0	27	124.2	26.4	77	173.1	36.8	27	222.0	47.2	77	270.9	57.6
28	27.4	05.8	78	76.3	16.2	28	125.2	26.6	78	174.1	37.0	28	223.0	47.4	78	271.9	57.8
29	28.4	06.0	79	77.3	16.4	29	126.2	26.8	79	175.1	37.2	29	224.0	47.6	79	272.9	58.0
30	29.3	06.2	80	78.2	16.6	30	127.1	27.0	80	176.0	37.4	30	224.9	47.8	80	273.8	58.2
31	30.3	06.4	81	79.2	16.8	131	128.1	27.2	181	177.0	37.6	231	225.9	48.0	281	274.8	58.4
32	31.3	06.7	82	80.2	17.1	32	129.1	27.5	82	178.0	37.9	32	226.9	48.3	82	275.8	58.7
33	32.3	06.9	83	81.2	17.3	33	130.1	27.7	83	179.0	38.1	33	227.9	48.5	83	276.8	58.9
34	33.3	07.1	84	82.2	17.5	34	131.1	27.9	84	180.9	38.3	34	228.9	48.7	84	277.8	59.1
35	34.2	07.3	85	83.1	17.7	35	132.0	28.1	85	180.0	38.5	35	229.8	48.9	85	278.7	59.3
36	35.2	07.5	86	84.1	17.9	136	133.0	28.3	186	181.9	38.7	236	230.8	49.1	286	279.7	59.5
37	36.2	07.7	87	85.1	18.0	37	134.0	28.5	87	182.9	38.9	37	231.8	49.3	87	280.7	59.7
38	37.2	07.9	88	86.1	18.3	38	135.0	28.7	88	183.9	39.1	38	232.8	49.5	88	281.7	59.9
39	38.1	08.1	89	87.0	18.5	39	135.9	28.9	89	184.8	39.3	39	233.7	49.7	89	282.6	60.1
40	39.1	08.3	90	88.0	18.7	40	136.9	29.1	90	185.8	39.5	40	234.7	49.9	90	283.6	60.3
41	40.1	08.5	91	89.0	18.9	141	137.9	29.3	191	186.8	39.7	241	235.7	50.1	291	284.6	60.5
42	41.1	08.7	92	90.0	19.1	42	138.9	29.5	92	187.8	39.9	42	236.7	50.3	92	285.6	60.7
43	42.1	08.9	93	91.0	19.3	43	139.9	29.7	93	188.8	40.1	43	237.7	50.5	93	286.6	60.9
44	43.0	09.2	94	91.9	19.6	44	140.8	30.0	94	189.7	40.4	44	238.6	50.8	94	287.5	61.2
45	44.0	09.4	95	92.9	19.8	45	141.8	30.2	95	190.7	40.6	45	239.6	51.0	95	288.5	61.4
46	45.0	09.6	96	93.9	20.0	146	142.8	30.4	196	191.7	40.8	246	240.6	51.2	296	289.5	61.6
47	46.0	09.8	97	94.9	20.2	47	143.8	30.6	97	192.7	41.0	47	241.6	51.4	97	290.5	61.8
48	46.9	10.0	98	95.8	20.4	48	144.7	30.8	98	193.6	41.2	48	242.5	51.6	98	291.4	62.0
49	47.9	10.2	99	96.8	20.6	49	145.7	31.0	99	194.6	41.4	49	243.5	51.8	99	292.4	62.2
50	48.9	10.4	100	97.8	20.8	150	146.7	31.2	200	195.6	41.6	250	244.5	52.0	300	293.4	62.4
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 78 Deg.

Difference of Latitude and Departure for 13 Deg.

13

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	01.0	00.2	51	49.7	11.5	101	98.4	22.7	151	147.1	34.0	201	195.9	45.2	251	244.6	56.5
2	01.9	00.4	52	50.7	11.7	02	99.4	22.9	52	148.1	34.2	02	196.8	45.4	52	245.5	56.7
3	02.9	00.7	53	51.6	11.9	03	100.4	23.2	53	149.1	34.4	03	197.8	45.7	53	246.5	56.9
4	03.9	00.9	54	52.6	12.1	04	101.3	23.4	54	150.1	34.6	04	198.8	45.9	54	247.5	57.1
5	04.9	01.1	55	53.6	12.4	05	102.3	23.6	55	151.0	34.9	05	199.7	46.1	55	248.5	57.4
6	05.8	01.3	56	54.6	12.6	106	103.3	23.8	156	152.0	35.1	206	200.7	46.3	256	249.4	57.6
7	06.8	01.6	57	55.5	12.8	07	104.3	24.1	57	153.0	35.3	07	201.7	46.6	57	250.4	57.8
8	07.8	01.8	58	56.5	13.0	08	105.2	24.3	58	154.0	35.5	08	202.7	46.8	58	251.4	58.0
9	08.8	02.0	59	57.5	13.3	09	106.2	24.5	59	154.9	35.8	09	203.6	47.0	59	252.4	58.3
10	09.7	02.2	60	58.5	13.5	10	107.2	24.7	60	155.9	36.0	10	204.6	47.2	60	253.3	58.5
11	10.7	02.5	61	59.4	13.7	111	108.2	25.0	161	156.9	36.2	211	205.6	47.5	261	254.3	58.7
12	11.7	02.7	62	60.4	13.9	12	109.1	25.2	62	157.9	36.4	12	206.6	47.7	62	255.3	58.9
13	12.7	02.9	63	61.4	14.2	13	110.1	25.4	63	158.8	36.7	13	207.5	47.9	63	256.3	59.2
14	13.6	03.1	64	62.4	14.4	14	111.1	25.6	64	159.8	36.9	14	208.5	48.1	64	257.2	59.4
15	14.6	03.4	65	63.3	14.6	15	112.1	25.9	65	160.8	37.1	15	209.5	48.4	65	258.2	59.6
16	15.6	03.6	66	64.3	14.8	116	113.0	26.1	166	161.7	37.3	216	210.5	48.6	266	259.2	59.8
17	16.6	03.8	67	65.3	15.1	17	114.0	26.3	67	162.7	37.6	17	211.4	48.8	67	260.2	60.1
18	17.5	04.0	68	66.3	15.3	18	115.0	26.5	68	163.7	37.8	18	212.4	49.0	68	261.1	60.3
19	18.5	04.3	69	67.2	15.5	19	116.0	26.8	69	164.7	38.0	19	213.4	49.3	69	262.1	60.5
20	19.5	04.5	70	68.2	15.7	20	116.9	27.0	70	165.6	38.2	20	214.4	49.5	70	263.1	60.7
21	20.5	04.7	71	69.2	16.0	121	117.9	27.2	171	166.6	38.5	221	215.3	49.7	271	264.1	61.0
22	21.4	04.9	72	70.2	16.2	22	118.9	27.4	72	167.6	38.7	22	216.3	49.9	72	265.0	61.2
23	22.4	05.2	73	71.1	16.4	23	119.8	27.7	73	168.6	38.9	23	217.3	50.2	73	266.0	61.4
24	23.4	05.4	74	72.1	16.6	24	120.8	27.9	74	169.5	39.1	24	218.3	50.4	74	267.0	61.6
25	24.4	05.6	75	73.1	16.9	25	121.8	28.1	75	170.5	39.4	25	219.2	50.6	75	268.0	61.9
26	25.3	05.8	76	74.1	17.1	126	122.8	28.3	176	171.5	39.6	226	220.2	50.8	276	268.9	62.1
27	26.3	06.1	77	75.0	17.3	27	123.7	28.6	77	172.5	39.8	27	221.2	51.1	77	269.9	62.3
28	27.3	06.3	78	76.0	17.5	28	124.7	28.8	78	173.4	40.0	28	222.2	51.3	78	270.9	62.5
29	28.3	06.5	79	77.0	17.8	29	125.7	29.0	79	174.4	40.3	29	223.1	51.5	79	271.9	62.8
30	29.2	06.7	80	78.0	18.0	30	126.7	29.2	80	175.4	40.5	30	224.1	51.7	80	272.8	63.0
31	30.2	07.0	81	78.9	18.2	131	127.6	29.5	181	176.4	40.7	231	225.1	52.0	281	273.8	63.2
32	31.2	07.2	82	79.9	18.4	32	128.6	29.7	82	177.3	40.9	32	226.1	52.2	82	274.8	63.4
33	32.2	07.4	83	80.9	18.7	33	129.6	29.9	83	178.3	41.2	33	227.0	52.4	83	275.8	63.7
34	33.1	07.6	84	81.8	18.9	34	130.6	30.1	84	179.3	41.4	34	228.0	52.6	84	276.7	63.9
35	34.1	07.9	85	82.8	19.1	35	131.5	30.4	85	180.3	41.6	35	229.0	52.9	85	277.7	64.1
36	35.1	08.1	86	83.8	19.3	136	132.5	30.6	186	181.2	41.8	236	230.0	53.1	286	278.7	64.3
37	36.1	08.3	87	84.8	19.6	37	133.5	30.8	87	182.2	42.1	37	230.9	53.3	87	279.6	64.6
38	37.0	08.5	88	85.7	9.8	38	134.5	31.0	88	183.2	42.3	38	231.9	53.5	88	280.6	64.8
39	38.0	08.8	89	86.7	20.0	39	135.4	31.3	89	184.2	42.5	39	232.9	53.8	89	281.6	65.0
40	39.0	09.0	90	87.7	20.2	40	136.4	31.5	90	185.1	42.7	40	233.9	54.0	90	282.6	65.2
41	39.9	09.2	91	88.7	20.5	141	137.4	31.7	191	186.1	43.0	41	234.8	54.2	291	283.5	65.5
42	40.9	09.4	92	89.6	20.7	42	138.4	31.9	92	187.1	43.2	42	235.8	54.4	92	284.3	65.7
43	41.9	09.7	93	90.6	20.9	43	139.3	32.2	93	188.1	43.4	43	236.8	54.7	93	285.5	65.9
44	42.9	09.9	94	91.6	21.1	44	140.3	32.4	94	189.0	43.6	44	237.8	54.9	94	286.5	66.1
45	43.8	10.1	95	92.6	21.4	45	141.3	32.6	95	190.0	43.9	45	238.7	55.1	95	287.4	66.4
46	44.8	10.3	96	93.5	21.6	146	142.3	32.8	196	191.0	44.1	246	239.7	55.3	296	288.4	66.6
47	45.8	10.6	97	94.5	21.8	47	143.2	33.1	97	192.0	44.3	47	240.7	55.6	97	289.4	66.8
48	46.8	10.8	98	95.5	22.0	48	144.2	33.3	98	192.9	44.5	48	241.6	55.8	98	290.4	67.0
49	47.7	11.0	99	96.5	22.3	49	145.2	33.5	99	193.9	44.8	49	242.6	56.0	99	291.3	67.3
50	48.6	11.2	100	97.4	22.5	150	146.2	33.7	200	194.9	45.0	250	243.6	56.2	300	292.3	67.5
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 77 Deg.

14 Difference of Latitude and Departure for 14 Deg.

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	01.0	00.2	51	49.5	12.3	101	98.0	24.4	151	146.5	36.5	201	195.0	48.6	251	243.5	60.7
2	01.9	00.5	52	50.5	12.6	02	99.0	24.7	52	147.5	36.8	02	196.0	48.9	52	244.5	61.0
3	02.9	00.7	53	51.4	12.8	03	99.9	24.9	53	148.5	37.0	03	197.0	49.1	53	245.5	61.2
4	03.9	01.0	54	52.4	13.1	04	100.5	25.2	54	149.4	37.3	04	197.9	49.4	54	246.4	61.5
5	04.9	01.2	55	53.4	13.3	05	101.9	25.4	55	150.4	37.5	05	198.9	49.6	55	247.4	61.7
6	05.8	01.5	56	54.3	13.6	106	102.8	25.7	156	151.4	37.6	206	199.9	49.9	256	248.4	62.0
7	06.8	01.7	57	55.3	13.8	07	103.8	25.9	57	152.3	38.0	07	200.8	50.9	57	249.3	62.2
8	07.8	01.9	58	56.3	14.0	08	104.8	26.1	58	153.3	38.2	08	201.8	50.3	58	250.3	62.4
9	08.7	02.2	59	57.2	14.3	09	105.8	26.4	59	154.3	38.5	09	202.8	50.6	59	251.3	62.7
10	09.7	02.4	60	58.2	14.5	10	106.7	26.6	60	155.2	38.7	10	203.8	50.8	60	252.3	62.9
11	10.7	02.7	61	59.2	14.8	111	107.7	26.9	161	156.2	39.0	211	204.7	51.1	261	253.2	63.2
12	11.6	02.9	62	60.2	15.0	12	108.7	27.1	62	157.2	39.2	12	205.7	51.3	62	254.2	63.4
13	12.6	03.1	63	61.1	15.2	13	109.6	27.3	63	158.2	39.4	13	206.7	51.5	63	255.2	63.6
14	13.6	03.4	64	62.1	15.5	14	110.6	27.6	64	159.1	39.7	14	207.6	51.8	64	256.2	63.9
15	14.6	03.6	65	63.1	15.7	15	111.6	27.8	65	160.1	39.9	15	208.6	52.0	65	257.1	64.1
16	15.5	03.9	66	64.0	16.0	116	112.6	28.1	166	161.1	40.2	216	209.6	52.3	266	258.1	64.4
17	16.5	04.1	67	65.0	16.2	17	113.5	28.3	67	162.0	40.4	17	210.5	52.5	67	259.1	64.6
18	17.5	04.4	68	66.0	16.5	18	114.5	28.6	68	163.0	40.7	18	211.5	52.8	68	260.0	64.9
19	18.4	04.6	69	66.9	16.7	19	115.5	28.8	69	164.0	40.9	19	212.5	53.0	69	261.0	65.1
20	19.4	04.8	70	67.9	16.9	20	116.4	29.0	70	164.9	41.1	20	213.5	53.2	70	262.0	65.3
21	20.4	05.1	71	68.9	17.2	121	117.4	29.3	171	165.9	41.4	221	214.4	53.5	271	262.9	65.6
22	21.3	05.3	72	69.9	17.4	22	118.4	29.5	72	166.9	41.6	22	215.4	53.7	72	263.9	65.8
23	22.3	05.6	73	70.8	17.7	23	119.3	29.8	73	167.9	41.9	23	216.4	54.0	73	264.9	66.1
24	23.3	05.8	74	71.8	17.9	24	120.3	30.0	74	168.8	42.1	24	217.3	54.2	74	265.9	66.3
25	24.3	06.0	75	72.8	18.1	25	121.3	30.2	75	169.8	42.3	25	218.3	54.4	75	266.8	66.5
26	25.2	06.3	76	73.7	18.4	126	122.3	30.5	176	170.8	42.6	226	219.3	54.7	276	267.8	66.8
27	26.2	06.5	77	74.7	18.6	27	123.2	30.7	77	171.7	42.8	27	220.3	54.9	77	268.8	67.0
28	27.2	06.8	78	75.7	18.9	28	124.2	31.0	78	172.7	43.1	28	221.2	55.2	78	269.7	67.3
29	28.1	07.0	79	76.7	19.1	29	125.2	31.2	79	173.7	43.3	29	222.2	55.4	79	270.7	67.5
30	29.1	07.3	80	77.6	19.4	30	126.1	31.5	80	174.6	43.6	30	223.2	55.7	80	271.7	67.8
31	30.1	07.5	81	78.6	19.6	131	127.1	31.7	181	175.6	43.8	231	224.1	55.9	281	272.6	68.0
32	31.0	07.7	82	79.6	19.8	32	128.1	31.9	82	176.6	44.0	32	225.1	56.1	82	273.6	68.2
33	32.0	08.0	83	80.5	20.1	33	129.0	32.2	83	177.6	44.3	33	226.1	56.4	83	274.6	68.5
34	33.0	08.2	84	81.5	20.3	34	130.0	32.4	84	178.5	44.5	34	227.0	56.6	84	275.6	68.7
35	34.0	08.5	85	82.5	20.6	35	131.0	32.7	85	179.5	44.8	35	228.0	56.9	85	276.5	69.0
36	34.9	08.7	86	83.4	20.8	136	132.0	32.9	186	180.5	45.0	236	229.0	57.1	286	277.5	69.2
37	35.9	09.0	87	84.4	21.1	37	132.9	33.2	87	181.4	45.3	37	230.0	57.4	87	278.5	69.5
38	36.9	09.2	88	85.4	21.3	38	133.9	33.4	88	182.4	45.5	38	230.9	57.6	88	279.4	69.7
39	37.8	09.4	89	86.4	21.5	39	134.9	33.6	89	183.4	45.7	39	231.9	57.8	89	280.4	69.9
40	38.8	09.7	90	87.2	21.8	40	135.8	33.9	90	184.4	46.0	40	232.9	58.1	90	281.4	70.2
41	39.8	09.9	91	88.3	22.0	141	136.8	34.1	191	185.3	46.2	241	233.8	58.3	291	282.3	70.4
42	40.8	10.2	92	89.3	22.3	42	137.8	34.4	92	186.3	46.5	42	234.8	58.6	92	283.3	70.7
43	41.7	10.5	93	90.2	22.5	43	138.7	34.6	93	187.3	46.7	43	235.8	58.8	93	284.3	70.9
44	42.7	10.6	94	91.2	22.7	44	139.7	34.8	94	188.2	46.9	44	236.7	59.0	94	285.3	71.1
45	43.7	10.9	95	92.2	23.0	45	140.7	35.1	95	189.2	47.2	45	237.7	59.3	95	286.2	71.4
46	44.6	11.1	96	93.1	23.2	146	141.7	35.3	196	190.2	47.4	246	238.7	59.5	296	287.2	71.6
47	45.6	11.4	97	94.1	23.5	47	142.6	35.6	97	191.1	47.7	47	239.7	59.8	97	288.2	71.9
48	46.6	11.6	98	95.1	23.7	48	143.6	35.8	98	192.1	47.9	48	240.6	60.0	98	289.1	72.1
49	47.5	11.9	99	96.1	24.0	49	144.6	36.1	99	193.1	48.2	49	241.6	60.3	99	290.1	72.4
50	48.5	12.1	100	97.0	24.2	150	145.6	36.3	200	194.1	48.4	250	242.6	60.5	300	291.1	72.6
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 76 Deg.

Difference of Latitude and Departure for 15 Deg. 15

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.3	51	49.3	13.2	101	97.6	26.1	151	145.9	39.1	201	194.1	52.0	251	242.4	65.0
2	01.9	00.5	52	50.2	13.5	02	98.5	26.4	52	146.8	39.3	02	195.1	52.3	52	243.4	65.2
3	02.9	00.8	53	51.2	13.7	03	99.5	26.7	53	147.8	39.6	03	196.1	52.5	53	244.4	65.5
4	03.9	01.0	54	52.2	14.0	04	100.5	26.9	54	148.7	39.9	04	197.0	52.8	54	245.3	65.7
5	04.8	01.3	55	53.1	14.2	05	101.4	27.2	55	149.7	40.2	05	198.0	53.1	55	246.3	66.0
6	05.8	01.6	56	54.1	14.5	06	102.4	27.4	56	150.7	40.4	06	199.0	53.3	56	247.3	66.3
7	06.8	01.8	57	55.1	14.8	07	103.4	27.7	57	151.6	40.6	07	199.9	53.6	57	248.2	66.5
8	07.7	02.1	58	56.0	15.0	08	104.3	28.0	58	152.6	40.9	08	200.9	53.8	58	249.2	66.8
9	08.7	02.3	59	57.0	15.3	09	105.3	28.2	59	153.6	41.1	09	201.9	54.1	59	250.2	67.0
10	09.7	02.6	60	58.0	15.5	10	106.2	28.5	60	154.5	41.4	10	202.8	54.3	60	251.1	67.3
11	10.6	02.8	61	58.9	15.8	11	107.2	28.7	61	155.5	41.7	11	203.8	54.6	61	252.1	67.5
12	11.6	03.1	62	59.9	16.0	12	108.2	29.0	62	156.5	41.9	12	204.8	54.9	62	253.1	67.8
13	12.6	03.4	63	60.9	16.3	13	109.1	29.2	63	157.4	42.2	13	205.7	55.1	63	254.0	68.1
14	13.5	03.6	64	61.8	16.6	14	110.1	29.5	64	158.4	42.4	14	206.7	55.4	64	255.0	68.3
15	14.5	03.9	65	62.8	16.8	15	111.1	29.8	65	159.4	42.7	15	207.7	55.6	65	256.0	68.6
16	15.5	04.1	66	63.7	17.1	16	112.0	30.0	66	160.3	43.0	16	208.6	55.9	66	256.9	68.8
17	16.4	04.4	67	64.7	17.3	17	113.0	30.3	67	161.3	43.2	17	209.6	56.1	67	257.9	69.1
18	17.4	04.7	68	65.7	17.6	18	114.0	30.5	68	162.3	43.5	18	210.6	56.4	68	258.9	69.4
19	18.4	04.9	69	66.6	17.9	19	114.9	30.8	69	163.2	43.7	19	211.5	56.7	69	259.8	69.6
20	19.3	05.2	70	67.6	18.1	20	115.9	31.1	70	164.2	44.0	20	212.5	56.9	70	260.8	69.9
21	20.3	05.4	71	68.6	18.4	21	116.9	31.3	71	165.2	44.3	21	213.5	57.2	71	261.8	70.1
22	21.2	05.7	72	69.5	18.6	22	117.0	31.6	72	166.1	44.5	22	214.4	57.5	72	262.7	70.4
23	22.2	06.0	73	70.5	18.9	23	118.8	31.8	73	167.1	44.8	23	215.4	57.7	73	263.7	70.7
24	23.2	06.2	74	71.5	19.2	24	119.8	32.1	74	168.1	45.0	24	216.4	58.0	74	264.7	70.9
25	24.1	06.5	75	72.4	19.4	25	120.7	32.4	75	169.0	45.3	25	217.3	58.2	75	265.6	71.2
26	25.1	06.7	76	73.4	19.7	26	121.7	32.6	76	170.0	45.5	26	218.3	58.5	76	266.6	71.4
27	26.1	07.0	77	74.4	19.9	27	122.7	32.9	77	171.0	45.8	27	219.3	58.7	77	267.6	71.7
28	27.0	07.2	78	75.3	20.2	28	123.6	33.1	78	171.9	46.1	28	220.2	59.0	78	268.5	71.9
29	28.0	07.5	79	76.3	20.4	29	124.6	33.4	79	172.9	46.3	29	221.2	59.3	79	269.5	72.2
30	29.0	07.8	80	77.3	20.7	30	125.6	33.6	80	173.9	46.6	30	222.2	59.5	80	270.5	72.5
31	29.9	08.0	81	78.2	21.0	31	126.5	33.9	81	174.8	46.8	31	223.1	59.8	81	271.4	72.7
32	30.9	08.3	82	79.2	21.2	32	127.5	34.2	82	175.8	47.1	32	224.1	60.0	82	272.4	73.0
33	31.9	08.5	83	80.2	21.5	33	128.5	34.4	83	176.8	47.4	33	225.1	60.3	83	273.4	73.2
34	32.8	08.8	84	81.1	21.7	34	129.4	34.7	84	177.7	47.6	34	226.0	60.6	84	274.3	73.5
35	33.8	09.1	85	82.1	22.0	35	130.4	34.9	85	178.7	47.9	35	227.0	60.8	85	275.3	73.8
36	34.8	09.3	86	83.1	22.3	36	131.4	35.2	86	179.7	48.1	36	228.0	61.1	86	276.2	74.0
37	35.7	09.6	87	84.0	22.5	37	132.3	35.5	87	180.6	48.4	37	228.9	61.3	87	277.2	74.3
38	36.7	09.8	88	85.0	22.8	38	133.3	35.7	88	181.6	48.7	38	229.9	61.6	88	278.2	74.5
39	37.7	10.1	89	86.0	23.0	39	134.3	36.0	89	182.6	48.9	39	230.9	61.9	89	279.1	74.8
40	38.6	10.4	90	86.9	23.3	40	135.2	36.2	90	183.5	49.2	40	231.8	62.1	90	280.1	75.0
41	39.6	10.6	91	87.9	23.6	41	136.2	36.5	91	184.5	49.4	41	232.8	62.4	91	281.1	75.3
42	40.6	10.9	92	88.9	23.8	42	137.2	36.7	92	185.5	49.7	42	233.7	62.6	92	282.0	75.6
43	41.5	11.1	93	89.8	24.1	43	138.1	37.0	93	186.4	49.9	43	234.7	62.9	93	283.0	75.8
44	42.5	11.4	94	90.8	24.3	44	139.1	37.3	94	187.4	50.2	44	235.7	63.1	94	284.0	76.1
45	43.5	11.6	95	91.8	24.6	45	140.1	37.5	95	188.4	50.5	45	236.6	63.4	95	284.9	76.3
46	44.4	11.9	96	92.7	24.8	46	141.0	37.8	96	189.3	50.7	46	237.6	63.7	96	285.9	76.6
47	45.4	12.2	97	93.7	25.1	47	142.0	38.0	97	190.3	51.0	47	238.6	63.9	97	286.9	76.9
48	46.4	12.4	98	94.7	25.4	48	143.0	38.3	98	191.2	51.2	48	239.5	64.2	98	287.8	77.1
49	47.3	12.7	99	95.6	25.6	49	143.9	38.6	99	192.2	51.5	49	240.5	64.4	99	288.8	77.4
50	48.3	12.9	100	96.6	25.9	50	144.9	38.8	100	193.2	51.8	50	241.5	64.7	100	289.8	77.6
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 75 Deg.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.3	51	49.0	14.1	101	97.1	27.5	151	145.1	41.6	201	193.2	55.4	251	241.2	69.2
2	01.9	00.6	52	50.0	14.3	02	98.0	28.1	52	146.1	41.9	02	194.1	55.7	52	242.2	69.5
3	02.9	00.8	53	50.9	14.6	03	99.0	28.4	53	147.1	42.2	03	195.1	55.9	53	243.2	69.7
4	03.8	01.1	54	51.9	14.9	04	100.0	28.7	54	148.0	42.4	04	196.1	56.2	54	244.1	70.0
5	04.8	01.4	55	52.9	15.2	05	100.9	28.9	55	149.0	42.7	05	197.0	56.5	55	245.1	70.3
6	05.8	01.7	56	53.8	15.4	06	101.9	29.2	156	149.9	43.0	206	198.0	56.8	256	246.0	70.6
7	06.7	01.9	57	54.8	15.7	07	102.8	29.5	57	150.9	43.3	07	199.0	57.0	57	247.0	70.8
8	07.7	02.2	58	55.7	16.0	08	103.8	29.8	58	151.9	43.5	08	199.9	57.3	58	248.0	71.1
9	08.7	02.5	59	56.7	16.3	09	104.8	30.0	59	152.8	43.8	09	200.9	57.6	59	248.9	71.4
10	09.6	02.8	60	57.7	16.5	10	105.7	30.3	60	153.8	44.1	10	201.8	57.9	60	249.9	71.7
11	10.6	03.0	61	58.6	16.8	11	106.7	30.6	161	154.7	44.4	211	202.8	58.2	261	250.9	71.9
12	11.5	03.3	62	59.6	17.1	12	107.6	30.9	62	155.7	44.6	12	203.8	58.4	62	251.8	72.2
13	12.5	03.6	63	60.6	17.4	13	108.6	31.1	63	156.7	44.9	13	204.7	58.7	63	252.8	72.5
14	13.5	03.9	64	61.5	17.6	14	109.6	31.4	64	157.6	45.2	14	205.7	59.0	64	253.7	72.8
15	14.4	04.1	65	62.5	17.9	15	110.5	31.7	65	158.6	45.5	15	206.6	59.3	65	254.7	73.0
16	15.4	04.4	66	63.4	18.2	116	111.5	32.0	166	159.5	45.7	216	207.6	59.5	266	255.7	73.3
17	16.3	04.7	67	64.4	18.5	17	112.5	32.2	67	160.5	46.0	17	208.6	59.8	67	256.6	73.6
18	17.3	05.0	68	65.4	18.7	18	113.4	32.5	68	161.5	46.3	18	209.5	60.1	68	257.6	73.9
19	18.3	05.2	69	66.3	19.0	19	114.4	32.8	69	162.4	46.6	19	210.5	60.4	69	258.5	74.1
20	19.2	05.5	70	67.3	19.3	20	115.3	33.1	70	163.4	46.9	20	211.4	60.6	70	259.5	74.4
21	20.2	05.8	71	68.2	19.6	21	116.3	33.3	171	164.4	47.1	221	212.4	60.9	271	260.5	74.7
22	21.1	06.1	72	69.2	19.8	22	117.3	33.6	72	165.3	47.4	22	213.4	61.2	72	261.4	75.0
23	22.1	06.3	73	70.2	20.1	23	118.2	33.9	73	166.3	47.7	23	214.3	61.5	73	262.4	75.2
24	23.1	06.6	74	71.1	20.4	24	119.2	34.2	74	167.2	48.0	24	215.3	61.7	74	263.3	75.5
25	24.0	06.9	75	72.1	20.7	25	120.1	34.4	75	168.2	48.2	25	216.3	62.0	75	264.3	75.8
26	25.0	07.2	76	73.0	20.9	26	121.1	34.7	176	169.2	48.5	226	217.2	62.3	276	265.3	76.1
27	26.0	07.4	77	74.0	21.2	27	122.1	35.0	77	170.1	48.8	27	218.2	62.6	77	266.2	76.3
28	26.9	07.7	78	75.0	21.5	28	123.0	35.3	78	171.1	49.1	28	219.1	62.8	78	267.2	76.6
29	27.9	08.0	79	75.9	21.8	29	124.0	35.6	79	172.0	49.3	29	220.1	63.1	79	268.2	76.9
30	28.8	08.3	80	76.9	22.0	30	124.9	35.8	80	173.0	49.6	30	221.1	63.4	80	269.1	77.2
31	29.8	08.5	81	77.9	22.3	31	125.9	36.1	181	174.0	49.9	231	222.0	63.7	281	270.1	77.4
32	30.8	08.8	82	78.8	22.6	32	126.9	36.4	82	174.9	50.2	32	223.0	63.9	82	271.0	77.7
33	31.7	09.1	83	79.8	22.9	33	127.8	36.7	83	175.9	50.4	33	223.9	64.2	83	272.0	78.0
34	32.7	09.4	84	80.7	23.1	34	128.8	36.9	84	176.8	50.7	34	224.9	64.5	84	273.0	78.3
35	33.6	09.6	85	81.7	23.4	35	129.8	37.2	85	177.8	51.0	35	225.9	64.8	85	273.9	78.5
36	34.6	09.9	86	82.7	23.7	36	130.7	37.5	186	178.8	51.3	236	226.8	65.0	286	274.9	78.8
37	35.6	10.2	87	83.6	24.0	37	131.7	37.8	87	179.7	51.5	37	227.8	65.3	87	275.8	79.1
38	36.5	10.5	88	84.6	24.3	38	132.6	38.0	88	180.7	51.8	38	228.7	65.6	88	276.8	79.4
39	37.5	10.7	89	85.5	24.5	39	133.6	38.3	89	181.7	52.1	39	229.7	65.9	89	277.8	79.6
40	38.4	11.0	90	86.5	24.8	40	134.6	38.6	90	182.6	52.4	40	230.7	66.1	90	278.7	79.9
41	39.4	11.3	91	87.5	25.1	41	135.5	38.9	191	183.6	52.6	241	231.6	66.4	291	279.7	80.2
42	40.4	11.6	92	88.4	25.4	42	136.5	39.1	92	184.5	52.9	42	232.6	66.7	92	280.6	80.5
43	41.3	11.9	93	89.4	25.6	43	137.4	39.4	93	185.5	53.2	43	233.6	67.0	93	281.6	80.8
44	42.3	12.1	94	90.3	25.9	44	138.4	39.7	94	186.5	53.5	44	234.5	67.2	94	282.6	81.0
45	43.3	12.4	95	91.3	26.2	45	139.4	40.0	95	187.4	53.7	45	235.5	67.5	95	283.5	81.3
46	44.2	12.7	96	92.3	26.5	46	140.3	40.2	196	188.4	54.0	246	236.4	67.8	296	284.5	81.6
47	45.2	13.0	97	93.2	26.7	47	141.3	40.5	97	189.3	54.3	47	237.4	68.1	97	285.5	81.9
48	46.1	13.2	98	94.2	27.0	48	142.2	40.8	98	190.3	54.6	48	238.4	68.3	98	286.4	82.1
49	47.1	13.5	99	95.2	27.3	49	143.2	41.1	99	191.3	54.8	49	239.3	68.6	99	287.4	82.4
50	48.1	13.8	100	96.1	27.6	50	144.2	41.3	200	192.2	55.1	250	240.3	68.9	300	288.3	82.7
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 74 Deg.

Difference of Latitude and Departure for 17 Deg. 17

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.3	51	48.8	14.9	101	96.6	29.5	151	144.4	44.1	201	192.2	58.8	251	240.0	73.3
2	01.9	00.6	52	49.7	15.2	02	97.5	29.8	52	145.3	44.4	02	193.2	59.0	52	241.0	73.6
3	02.9	00.9	53	50.7	15.5	03	98.5	30.1	53	146.3	44.7	03	194.1	59.3	53	241.9	73.9
4	03.8	01.2	54	51.6	15.8	04	99.4	30.4	54	147.3	45.0	04	195.1	59.6	54	242.9	74.1
5	04.8	01.5	55	52.6	16.1	05	100.4	30.7	55	148.2	45.3	05	196.0	59.9	55	243.8	74.4
6	05.7	01.8	56	53.5	16.4	06	101.4	31.0	56	149.2	45.6	06	197.0	60.2	56	244.8	74.7
7	06.7	02.0	57	54.5	16.7	07	102.3	31.3	57	150.1	45.9	07	197.9	60.5	57	245.8	75.0
8	07.6	02.3	58	55.5	17.0	08	103.3	31.6	58	151.1	46.2	08	198.9	60.8	58	246.7	75.3
9	08.6	02.6	59	56.4	17.2	09	104.2	31.9	59	152.0	46.5	09	199.9	61.1	59	247.7	75.6
10	09.6	02.9	60	57.4	17.5	10	105.2	32.2	60	153.0	46.8	10	200.8	61.4	60	248.6	75.9
11	10.5	03.2	61	58.3	17.8	11	106.1	32.4	61	154.0	47.1	11	201.8	61.7	61	249.6	76.2
12	11.5	03.5	62	59.3	18.1	12	107.1	32.7	62	154.9	47.4	12	202.7	62.0	62	250.5	76.5
13	12.4	03.8	63	60.2	18.4	13	108.1	33.0	63	155.9	47.6	13	203.7	62.3	63	251.5	76.8
14	13.4	04.1	64	61.2	18.7	14	109.0	33.3	64	156.8	47.9	14	204.6	62.6	64	252.4	77.1
15	14.3	04.4	65	62.2	19.0	15	110.0	33.6	65	157.8	48.2	15	205.6	62.8	65	253.4	77.4
16	15.3	04.7	66	63.1	19.3	16	110.9	33.9	66	158.7	48.5	16	206.5	63.1	66	254.4	77.7
17	16.3	05.0	67	64.1	19.6	17	111.9	34.2	67	159.7	48.8	17	207.5	63.4	67	255.3	77.9
18	17.2	05.3	68	65.0	19.9	18	112.8	34.5	68	160.6	49.1	18	208.5	63.7	68	256.3	78.2
19	18.2	05.6	69	66.0	20.2	19	113.8	34.8	69	161.6	49.4	19	209.4	64.0	69	257.2	78.5
20	19.1	05.8	70	66.9	20.5	20	114.7	35.1	70	162.6	49.7	20	210.4	64.3	70	258.2	78.8
21	20.1	06.1	71	67.9	20.8	21	115.7	35.4	71	163.5	50.0	21	211.3	64.6	71	259.1	79.1
22	21.0	06.4	72	68.8	21.0	22	116.7	35.7	72	164.5	50.3	22	212.3	64.9	72	260.1	79.4
23	22.0	06.7	73	69.8	21.3	23	117.6	36.0	73	165.4	50.6	23	213.2	65.2	73	261.1	79.7
24	22.9	07.0	74	70.8	21.6	24	118.6	36.2	74	166.4	50.9	24	214.2	65.5	74	262.0	80.0
25	23.9	07.3	75	71.7	21.9	25	119.5	36.5	75	167.3	51.2	25	215.2	65.8	75	263.0	80.3
26	24.9	07.6	76	72.7	22.2	26	120.5	36.8	76	168.3	51.4	26	216.1	66.1	76	263.9	80.6
27	25.8	07.9	77	73.6	22.5	27	121.4	37.1	77	169.3	51.7	27	217.1	66.4	77	264.9	80.9
28	26.8	08.2	78	74.6	22.8	28	122.4	37.4	78	170.2	52.0	28	218.0	66.6	78	265.8	81.2
29	27.7	08.5	79	75.5	23.1	29	123.4	37.7	79	171.2	52.3	29	219.0	66.9	79	266.8	81.5
30	28.7	08.8	80	76.5	23.4	30	124.3	38.0	80	172.1	52.6	30	219.9	67.2	80	267.7	81.7
31	29.6	09.1	81	77.5	23.7	31	125.3	38.3	81	173.1	52.9	31	220.9	67.5	81	268.7	82.0
32	30.6	09.4	82	78.4	24.0	32	126.2	38.6	82	174.0	53.2	32	221.8	67.8	82	269.7	82.3
33	31.6	09.6	83	79.4	24.3	33	127.2	38.9	83	175.0	53.5	33	222.8	68.1	83	270.6	82.6
34	32.5	09.9	84	80.3	24.6	34	128.1	39.2	84	175.9	53.8	34	223.8	68.4	84	271.6	82.9
35	33.5	10.2	85	81.3	24.8	35	129.1	39.5	85	176.9	54.1	35	224.7	68.7	85	272.5	83.2
36	34.4	10.5	86	82.2	25.1	36	130.0	39.8	86	177.9	54.4	36	225.7	69.0	86	273.5	83.5
37	35.4	10.8	87	83.2	25.4	37	131.0	40.0	87	178.8	54.7	37	226.6	69.3	87	274.4	83.8
38	36.3	11.1	88	84.1	25.7	38	132.0	40.3	88	179.8	55.0	38	227.6	69.6	88	275.4	84.1
39	37.3	11.4	89	85.1	26.0	39	132.9	40.6	89	180.7	55.2	39	228.5	69.9	89	276.4	84.4
40	38.2	11.7	90	86.1	26.3	40	133.9	40.9	90	181.7	55.5	40	229.5	70.2	90	277.3	84.7
41	39.2	12.0	91	87.0	26.6	41	134.8	41.2	91	182.6	55.8	41	230.5	70.4	91	278.3	85.0
42	40.2	12.3	92	88.0	26.9	42	135.8	41.5	92	183.6	56.1	42	231.4	70.7	92	279.2	85.3
43	41.1	12.6	93	88.9	27.2	43	136.7	41.8	93	184.6	56.4	43	232.4	71.0	93	280.2	85.5
44	42.1	12.9	94	89.9	27.5	44	137.7	42.1	94	185.5	56.7	44	233.3	71.3	94	281.1	85.8
45	43.0	13.2	95	90.8	27.8	45	138.7	42.4	95	186.5	57.0	45	234.3	71.6	95	282.1	86.1
46	44.0	13.4	96	91.8	28.1	46	139.6	42.7	96	187.4	57.3	46	235.2	71.9	96	283.0	86.4
47	44.9	13.7	97	92.8	28.4	47	140.6	43.0	97	188.4	57.6	47	236.2	72.1	97	284.0	86.7
48	45.9	14.0	98	93.7	28.6	48	141.5	43.3	98	189.3	57.9	48	237.1	72.4	98	285.0	87.0
49	46.9	14.3	99	94.7	28.9	49	142.5	43.6	99	190.3	58.2	49	238.1	72.7	99	285.9	87.3
50	47.8	14.6	100	95.6	29.2	50	143.4	43.8	100	191.2	58.5	50	239.1	73.0	100	286.9	87.6

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39/5160/192
126
96

for 73 Deg.

18 Difference of Latitude and Departure for 18 Deg.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.3	51	48.5	15.8	101	96.1	31.2	151	143.6	46.7	201	191.2	62.1	251	238.7	77.6
2	01.9	00.6	52	49.5	16.1	02	97.0	31.5	52	144.6	47.0	02	192.1	62.4	52	239.7	77.9
3	02.9	00.9	53	50.4	16.4	03	98.0	31.8	53	145.5	47.3	03	193.1	62.7	53	240.6	78.2
4	03.8	01.2	54	51.4	16.7	04	98.9	32.1	54	146.5	47.6	04	194.0	63.0	54	241.6	78.5
5	04.8	01.5	55	52.3	17.0	05	99.9	32.4	55	147.4	47.9	05	195.0	63.3	55	242.5	78.8
6	05.7	01.9	56	53.3	17.3	06	100.1	32.8	56	148.4	48.2	06	195.9	63.7	56	243.5	79.1
7	06.7	02.2	57	54.2	17.6	07	101.8	33.1	57	149.3	48.5	07	196.9	64.0	57	244.4	79.4
8	07.6	02.5	58	55.2	17.9	08	102.7	33.4	58	150.3	48.8	08	197.1	64.3	58	245.4	79.7
9	08.6	02.8	59	56.1	18.2	09	103.7	33.7	59	151.2	49.1	09	198.8	64.6	59	246.3	80.0
10	09.5	03.1	60	57.1	18.5	10	104.6	34.0	60	152.2	49.4	10	199.7	64.9	60	247.3	80.3
11	10.5	03.4	61	58.0	18.8	11	105.6	34.3	61	153.1	49.7	11	200.7	65.2	61	248.2	80.6
12	11.4	03.7	62	59.0	19.2	12	106.5	34.6	62	154.1	50.1	12	201.6	65.5	62	249.2	81.0
13	12.4	04.0	63	59.9	19.5	13	107.5	34.9	63	155.0	50.4	13	202.6	65.8	63	250.1	81.3
14	13.3	04.3	64	60.9	19.8	14	108.4	35.2	64	156.0	50.7	14	203.5	66.1	64	251.1	81.6
15	14.3	04.6	65	61.8	20.1	15	109.4	35.5	65	156.9	51.0	15	204.5	66.4	65	252.0	81.9
16	15.2	04.9	66	62.8	20.4	16	110.3	35.8	66	157.9	51.3	16	205.4	66.7	66	253.0	82.2
17	16.2	05.3	67	63.7	20.7	17	111.3	36.2	67	158.8	51.6	17	206.4	67.1	67	253.9	82.5
18	17.1	05.6	68	64.7	21.0	18	112.2	36.5	68	159.8	51.9	18	207.3	67.4	68	254.9	82.8
19	18.1	05.9	69	65.6	21.3	19	113.2	36.8	69	160.7	52.2	19	208.3	67.7	69	255.8	83.1
20	19.0	06.2	70	66.6	21.6	20	114.1	37.1	70	161.7	52.5	20	209.2	68.0	70	256.8	83.4
21	20.0	06.5	71	67.5	21.9	21	115.1	37.4	71	162.6	52.8	21	210.2	68.3	71	257.7	83.7
22	20.9	06.8	72	68.5	22.2	22	116.0	37.7	72	163.6	53.1	22	211.1	68.6	72	258.7	84.0
23	21.9	07.1	73	69.4	22.6	23	117.0	38.0	73	164.5	53.5	23	212.1	68.9	73	259.6	84.4
24	22.8	07.4	74	70.4	22.9	24	117.9	38.3	74	165.5	53.8	24	213.0	69.2	74	260.6	84.7
25	23.8	07.7	75	71.3	23.2	25	118.9	38.6	75	166.4	54.1	25	214.0	69.5	75	261.5	85.0
26	24.7	08.0	76	72.3	23.5	26	119.8	38.9	76	167.4	54.4	26	214.9	69.8	76	262.5	85.3
27	25.7	08.3	77	73.2	23.8	27	120.8	39.2	77	168.3	54.7	27	215.9	70.1	77	263.4	85.6
28	26.6	08.7	78	74.2	24.1	28	121.7	39.6	78	169.3	55.0	28	216.8	70.5	78	264.4	85.9
29	27.6	09.0	79	75.1	24.4	29	122.7	39.9	79	170.2	55.3	29	217.8	70.8	79	265.3	86.2
30	28.5	09.3	80	76.1	24.7	30	123.6	40.2	80	171.2	55.6	30	218.7	71.1	80	266.3	86.5
31	29.5	09.6	81	77.0	25.0	31	124.6	40.5	81	172.1	55.9	31	219.7	71.4	81	267.2	86.8
32	30.4	09.9	82	78.0	25.3	32	125.5	40.8	82	173.1	56.2	32	220.6	71.7	82	268.2	87.1
33	31.4	10.2	83	78.9	25.6	33	126.5	41.1	83	174.0	56.5	33	221.6	72.0	83	269.1	87.4
34	32.3	10.5	84	79.9	26.0	34	127.4	41.4	84	175.0	56.9	34	222.5	72.3	84	270.1	87.8
35	33.3	10.8	85	80.8	26.3	35	128.4	41.7	85	175.9	57.2	35	223.5	72.6	85	271.0	88.1
36	34.2	11.1	86	81.8	26.6	36	129.3	42.0	86	176.9	57.5	36	224.4	72.9	86	272.0	88.4
37	35.2	11.4	87	82.7	26.9	37	130.3	42.3	87	177.8	57.8	37	225.4	73.2	87	272.9	88.7
38	36.1	11.7	88	83.7	27.2	38	131.2	42.6	88	178.8	58.1	38	226.3	73.5	88	273.9	89.0
39	37.1	12.1	89	84.6	27.5	39	132.2	43.0	89	179.7	58.4	39	227.3	73.9	89	274.8	89.3
40	38.0	12.4	90	85.6	27.8	40	133.1	43.3	90	180.7	58.7	40	228.2	74.2	90	275.8	89.6
41	39.0	12.7	91	86.5	28.1	41	134.1	43.6	91	181.6	59.0	41	229.2	74.5	91	276.7	89.9
42	39.9	13.0	92	87.5	28.4	42	135.0	43.9	92	182.6	59.3	42	230.1	74.8	92	277.7	90.2
43	40.9	13.3	93	88.4	28.7	43	136.0	44.2	93	183.5	59.6	43	231.1	75.1	93	278.6	90.5
44	41.8	13.6	94	89.4	29.0	44	136.9	44.5	94	184.5	59.9	44	232.0	75.4	94	279.6	90.8
45	42.8	13.9	95	90.3	29.4	45	137.9	44.8	95	185.4	60.3	45	233.0	75.7	95	280.5	91.2
46	43.7	14.2	96	91.3	29.7	46	138.8	45.1	96	186.4	60.6	46	233.9	76.0	96	281.5	91.5
47	44.7	14.5	97	92.2	30.0	47	139.8	45.4	97	187.3	60.9	47	234.9	76.3	97	282.4	91.8
48	45.6	14.8	98	93.2	30.3	48	140.7	45.7	98	188.3	61.2	48	235.8	76.6	98	283.4	92.1
49	46.6	15.1	99	94.1	30.6	49	141.7	46.0	99	189.2	61.5	49	236.8	77.9	99	284.3	92.4
50	47.6	15.5	100	95.1	30.9	50	142.7	46.4	200	190.2	61.8	250	237.8	77.3	300	285.3	92.7
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 72 Deg.

Difference of Latitude and Departure for 19 Deg. 19

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	00.9	00.3	51	48.2	16.6	101	95.5	32.9	151	142.8	49.2	201	190.0	65.4	251	237.3	81.7
2	01.9	00.7	52	49.2	16.9	02	96.4	33.2	52	143.7	49.5	02	191.0	65.8	52	238.3	82.1
3	02.8	01.0	53	50.1	17.3	03	97.4	33.5	53	144.7	49.8	03	191.9	66.1	53	239.2	82.4
4	03.8	01.3	54	51.1	17.6	04	98.3	33.9	54	145.6	50.1	04	192.9	66.4	54	240.1	82.7
5	04.7	01.6	55	52.0	17.9	05	99.3	34.2	55	146.5	50.5	05	193.8	66.7	55	241.1	83.0
6	05.7	02.0	56	52.9	18.2	106	100.2	34.5	156	147.5	50.8	206	194.8	67.1	256	242.6	83.4
7	06.6	02.3	57	53.9	18.6	07	101.2	34.8	57	148.4	51.1	07	195.7	67.4	57	243.0	83.7
8	07.6	02.6	58	54.8	18.9	08	102.1	35.2	58	149.4	51.4	08	196.7	67.7	58	243.9	84.0
9	08.5	02.9	59	55.8	19.2	09	103.1	35.5	59	150.3	51.8	09	197.6	68.1	59	244.9	84.3
10	09.5	03.3	60	56.7	19.5	10	104.0	35.8	60	151.3	52.1	10	198.5	68.4	60	245.8	84.7
11	10.4	03.6	61	57.7	19.9	111	104.9	36.1	161	152.2	52.4	211	199.5	68.7	261	246.8	85.0
12	11.3	03.9	62	58.6	20.2	12	105.9	36.5	62	153.2	52.7	12	200.4	69.0	62	247.7	85.3
13	12.3	04.2	63	59.6	20.5	13	106.8	36.8	63	154.1	53.1	13	201.4	69.4	63	248.7	85.6
14	13.2	04.6	64	60.5	20.8	14	107.8	37.1	64	155.1	53.4	14	202.3	69.7	64	249.6	86.0
15	14.2	04.9	65	61.5	21.2	15	108.7	37.4	65	156.0	53.7	15	203.3	70.0	65	250.5	86.3
16	15.1	05.2	66	62.4	21.5	116	109.7	37.8	166	156.9	54.0	216	204.2	70.3	266	251.5	86.6
17	16.1	05.5	67	63.3	21.8	17	110.6	38.1	67	157.9	54.4	17	205.2	70.7	67	252.4	86.9
18	17.0	05.9	68	64.3	22.1	18	111.6	38.4	68	158.8	54.7	18	206.1	71.0	68	253.4	87.3
19	18.0	06.2	69	65.2	22.5	19	112.5	38.7	69	159.8	55.0	19	207.1	71.3	69	254.3	87.6
20	18.9	06.5	70	66.2	22.8	20	113.5	39.1	70	160.7	55.4	20	208.0	71.6	70	255.3	87.9
21	19.9	06.8	71	67.1	23.1	121	114.4	39.4	171	161.7	55.7	221	208.9	72.0	271	256.2	88.2
22	20.8	07.2	72	68.1	23.4	22	115.3	39.7	72	162.6	56.0	22	209.9	72.3	72	257.2	88.6
23	21.7	07.5	73	69.0	23.8	23	116.3	40.0	73	163.6	56.3	23	210.8	72.6	73	258.1	88.9
24	22.7	07.8	74	70.0	24.1	24	117.2	40.4	74	164.5	56.7	24	211.8	72.9	74	259.1	89.2
25	23.6	08.1	75	70.9	24.4	25	118.2	40.7	75	165.5	57.0	25	212.7	73.3	75	260.0	89.5
26	24.6	08.5	76	71.9	24.7	126	119.1	41.0	176	166.4	57.3	226	213.7	73.6	276	260.9	89.9
27	25.5	08.8	77	72.8	25.1	27	120.1	41.4	77	167.3	57.6	27	214.6	73.9	77	261.9	90.2
28	26.5	09.1	78	73.7	25.4	28	121.0	41.7	78	168.3	58.0	28	215.6	74.2	78	262.8	90.5
29	27.4	09.4	79	74.7	25.7	29	122.0	42.0	79	169.2	58.3	29	216.5	74.6	79	263.8	90.8
30	28.4	09.8	80	75.6	26.0	30	122.9	42.3	80	170.2	58.6	30	217.5	74.9	80	264.7	91.2
31	29.3	10.1	81	76.6	26.4	131	123.9	42.7	181	171.1	58.9	231	218.4	75.2	281	265.7	91.5
32	30.3	10.4	82	77.5	26.7	32	124.8	43.0	82	172.1	59.3	32	219.3	75.5	82	266.6	91.8
33	31.2	10.7	83	78.5	27.0	33	125.7	43.3	83	173.0	59.6	33	220.3	75.9	83	267.6	92.1
34	32.1	11.1	84	79.4	27.4	34	126.7	43.6	84	174.0	59.9	34	221.2	76.2	84	268.5	92.5
35	33.1	11.4	85	80.4	27.7	35	127.6	44.0	85	174.9	60.2	35	222.2	76.5	85	269.5	92.8
36	34.0	11.7	86	81.3	28.0	136	128.6	44.3	186	175.9	60.6	236	223.1	76.8	286	270.4	93.1
37	35.0	12.0	87	82.3	28.3	37	129.5	44.6	87	176.8	60.9	37	224.1	77.2	87	271.3	93.4
38	35.9	12.4	88	83.2	28.7	38	130.5	44.9	88	177.7	61.2	38	225.0	77.5	88	272.3	93.8
39	36.9	12.7	89	84.1	29.0	39	131.4	45.3	89	178.7	61.5	39	226.0	77.8	89	273.2	94.1
40	37.8	13.0	90	85.1	29.3	40	132.4	45.6	90	179.6	61.9	40	226.9	78.1	90	274.2	94.4
41	38.8	13.3	91	86.0	29.6	141	133.3	45.9	191	180.6	62.2	241	227.9	78.5	291	275.1	94.7
42	39.7	13.7	92	87.0	30.0	42	134.3	46.2	92	181.5	62.5	42	228.8	78.8	92	276.1	95.1
43	40.7	14.0	93	87.9	30.3	43	135.2	46.6	93	182.5	62.8	43	229.7	79.1	93	277.0	95.4
44	41.6	14.3	94	88.9	30.6	44	136.1	46.9	94	183.4	63.2	44	230.7	79.4	94	278.0	95.7
45	42.5	14.7	95	89.8	30.9	45	137.1	47.2	95	184.4	63.5	45	231.6	79.8	95	278.9	96.1
46	43.5	15.0	96	90.8	31.3	146	138.0	47.5	196	185.3	63.8	246	232.6	80.1	296	279.9	96.4
47	44.4	15.3	97	91.7	31.6	47	139.0	47.9	97	186.3	64.1	47	233.5	80.4	97	280.8	96.7
48	45.4	15.6	98	92.7	31.9	48	139.9	48.2	98	187.2	64.5	48	234.5	80.7	98	281.7	97.0
49	46.3	16.0	99	93.6	32.2	49	140.9	48.5	99	188.1	64.8	49	235.4	81.1	99	282.7	97.4
50	47.3	16.3	100	94.5	32.6	150	141.8	48.8	200	189.1	65.1	250	236.4	81.4	300	283.6	97.7
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 71 Deg.

20 Difference of Latitude and Departure for 20 Deg.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.9	00.3	51	47.9	17.4	101	94.9	34.5	151	141.9	51.6	201	188.9	68.7	251	235.9	85.8
2	01.9	00.7	52	48.9	17.8	02	95.8	34.9	52	142.8	52.0	02	189.8	69.1	52	236.8	86.2
3	02.8	01.0	53	49.8	18.1	03	96.8	35.2	53	143.8	52.3	03	190.8	69.4	53	237.7	86.5
4	03.8	01.4	54	50.7	18.5	04	97.7	35.6	54	144.7	52.7	04	191.7	69.8	54	238.7	86.9
5	04.7	01.7	55	51.7	18.8	05	98.7	35.9	55	145.7	53.0	05	192.6	70.1	55	239.6	87.2
6	05.6	02.1	56	52.6	19.2	06	99.6	36.3	56	146.6	53.4	06	193.6	70.5	56	240.6	87.6
7	06.6	02.4	57	53.6	19.5	07	100.5	36.6	57	147.5	53.7	07	194.5	70.8	57	241.5	87.9
8	07.5	02.7	58	54.5	19.8	08	101.5	36.9	58	148.5	54.0	08	195.5	71.1	58	242.4	88.2
9	08.5	03.1	59	55.4	20.2	09	102.4	37.3	59	149.4	54.4	09	196.4	71.5	59	243.4	88.6
10	09.4	03.4	60	56.4	20.5	10	103.4	37.6	60	150.4	54.7	10	197.3	71.8	60	244.3	88.9
11	10.3	03.8	61	57.3	20.9	11	104.3	38.0	61	151.3	55.1	11	198.3	72.2	61	245.3	89.3
12	11.3	04.1	62	58.3	21.2	12	105.2	38.3	62	152.2	55.4	12	199.2	72.5	62	246.2	89.6
13	12.2	04.4	63	59.2	21.5	13	106.2	38.6	63	153.2	55.7	13	200.2	72.8	63	247.1	89.9
14	13.2	04.8	64	60.1	21.9	14	107.1	39.0	64	154.1	56.1	14	201.1	73.2	64	248.1	90.3
15	14.1	05.1	65	61.1	22.2	15	108.1	39.3	65	155.1	56.4	15	202.0	73.5	65	249.0	90.6
16	15.0	05.5	66	62.0	22.6	16	109.0	39.7	66	156.0	56.8	16	203.0	73.9	66	250.0	91.0
17	16.0	05.8	67	63.0	22.9	17	109.9	40.0	67	156.9	57.1	17	203.9	74.2	67	250.9	91.3
18	16.9	06.2	68	63.9	23.3	18	110.8	40.4	68	157.9	57.5	18	204.9	74.6	68	251.8	91.7
19	17.9	06.5	69	64.8	23.6	19	111.8	40.7	69	158.8	57.8	19	205.8	74.9	69	252.8	92.0
20	18.8	06.8	70	65.8	23.9	20	112.8	41.0	70	159.7	58.1	20	206.7	75.2	70	253.7	92.3
21	19.7	07.2	71	66.7	24.3	21	113.7	41.4	71	160.7	58.5	21	207.7	75.6	71	254.7	92.7
22	20.7	07.5	72	67.7	24.6	22	114.6	41.7	72	161.6	58.8	22	208.6	75.9	72	255.6	93.0
23	21.6	07.9	73	68.6	25.0	23	115.6	42.1	73	162.6	59.2	23	209.6	76.3	73	256.5	93.4
24	22.6	08.2	74	69.5	25.3	24	116.5	42.4	74	163.5	59.5	24	210.5	76.6	74	257.5	93.7
25	23.5	08.6	75	70.5	25.7	25	117.5	42.8	75	164.4	59.9	25	211.4	77.0	75	258.4	94.1
26	24.4	08.9	76	71.4	26.0	26	118.4	43.1	76	165.4	60.2	26	212.4	77.3	76	259.4	94.4
27	25.4	09.2	77	72.4	26.3	27	119.3	43.4	77	166.3	60.5	27	213.3	77.6	77	260.3	94.7
28	26.3	09.6	78	73.3	26.7	28	120.3	43.8	78	167.3	60.9	28	214.3	78.0	78	261.2	95.1
29	27.3	09.9	79	74.2	27.0	29	121.2	44.1	79	168.2	61.2	29	215.2	78.3	79	262.2	95.4
30	28.2	10.3	80	75.2	27.4	30	122.2	44.5	80	169.1	61.6	30	216.1	78.7	80	263.1	95.8
31	29.1	10.6	81	76.1	27.7	31	123.1	44.9	81	170.1	61.9	31	217.1	79.0	81	264.1	96.1
32	30.1	10.9	82	77.1	28.0	32	124.0	45.1	82	171.0	62.2	32	218.0	79.3	82	265.0	96.4
33	31.0	11.3	83	78.0	28.4	33	125.0	45.5	83	172.0	62.6	33	219.0	79.7	83	265.9	96.8
34	31.9	11.6	84	78.9	28.7	34	125.9	45.8	84	172.9	62.9	34	219.9	80.0	84	266.9	97.1
35	32.9	12.0	85	79.9	29.1	35	126.9	46.2	85	173.8	63.3	35	220.8	80.4	85	267.8	97.5
36	33.8	12.3	86	80.8	29.4	36	127.8	46.5	86	174.8	63.6	36	221.8	80.7	86	268.8	97.8
37	34.8	12.7	87	81.8	29.8	37	128.7	46.9	87	175.7	64.0	37	222.7	81.1	87	269.7	98.2
38	35.7	13.0	88	82.7	30.1	38	129.7	47.2	88	176.7	64.3	38	223.6	81.4	88	270.6	98.5
39	36.6	13.3	89	83.6	30.4	39	130.6	47.5	89	177.6	64.6	39	224.6	81.7	89	271.6	98.8
40	37.6	13.7	90	84.6	30.8	40	131.6	47.9	90	178.5	65.0	40	225.5	82.1	90	272.5	99.2
41	38.5	14.0	91	85.5	31.1	41	132.5	48.2	91	179.5	65.3	41	226.5	82.4	91	273.5	99.5
42	39.5	14.4	92	86.5	31.5	42	133.4	48.6	92	180.4	65.7	42	227.4	82.8	92	274.4	99.9
43	40.4	14.7	93	87.4	31.8	43	134.4	48.9	93	181.4	66.0	43	228.3	83.1	93	275.3	100.2
44	41.3	15.0	94	88.3	32.1	44	135.3	49.2	94	182.3	66.3	44	229.3	83.4	94	276.3	100.5
45	42.3	15.4	95	89.3	32.5	45	136.3	49.6	95	183.2	66.7	45	230.2	83.8	95	277.2	100.9
46	43.2	15.7	96	90.2	32.8	46	137.2	49.9	96	184.2	67.0	46	231.2	84.1	96	278.2	101.1
47	44.2	16.1	97	91.2	33.2	47	138.1	50.3	97	185.1	67.4	47	232.1	84.5	97	279.1	101.6
48	45.1	16.4	98	92.1	33.5	48	139.1	50.6	98	186.1	67.7	48	233.0	84.8	98	280.0	101.9
49	46.0	16.8	99	93.0	33.9	49	140.0	51.0	99	187.0	68.1	49	234.0	85.2	99	281.0	102.3
50	47.0	17.1	100	94.0	34.2	50	141.0	51.3	100	187.9	68.4	50	234.9	85.5	100	281.9	102.6
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 70 Deg.

Difference of Latitude and Departure for 21 Deg. 21

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	00.9	00.4	51	47.6	18.3	101	94.3	36.2	151	141.0	54.1	201	187.6	72.0	251	234.3	90.0
2	01.9	00.7	52	48.5	18.6	02	95.3	36.6	52	141.9	54.5	02	188.6	72.4	52	235.3	90.3
3	02.8	01.1	53	49.5	19.0	03	96.2	36.9	53	142.9	54.8	03	189.5	72.8	53	236.2	90.7
4	03.7	01.4	54	50.4	19.4	04	97.1	37.3	54	143.8	55.2	04	190.4	73.1	54	237.1	91.0
5	04.7	01.8	55	51.3	19.7	05	98.1	37.6	55	144.7	55.6	05	191.4	73.5	55	238.1	91.4
6	05.6	02.2	56	52.3	20.1	106	99.0	38.0	156	145.7	55.9	206	192.3	73.8	256	239.0	91.8
7	06.5	02.5	57	53.2	20.4	07	99.9	38.3	57	146.6	56.3	07	193.2	74.2	57	239.9	92.1
8	07.5	02.9	58	54.1	20.8	08	100.9	38.7	58	147.5	56.6	08	194.2	74.5	58	240.9	92.5
9	08.4	03.2	59	55.1	21.1	09	101.8	39.1	59	148.5	57.0	09	195.1	74.9	59	241.8	92.8
10	09.3	03.6	60	56.0	21.5	10	102.7	39.4	60	149.4	57.3	10	196.0	75.3	60	242.7	93.2
11	10.3	03.9	61	56.9	21.9	111	103.7	39.8	161	150.3	57.7	211	197.0	75.6	261	243.7	93.2
12	11.2	04.3	62	57.9	22.2	12	104.6	40.1	62	151.3	58.1	12	197.9	76.0	62	244.6	93.5
13	12.1	04.7	63	58.8	22.6	13	105.5	40.5	63	152.2	58.4	13	198.8	76.3	63	245.5	94.3
14	13.1	05.0	64	59.7	22.9	14	106.5	40.9	64	153.1	58.8	14	199.8	76.7	64	246.5	94.6
15	14.0	05.4	65	60.7	23.3	15	107.4	41.2	65	154.1	59.1	15	200.7	77.1	65	247.4	95.0
16	14.9	05.7	66	61.6	23.7	116	108.3	41.6	166	155.0	59.5	216	201.6	77.4	266	248.3	95.3
17	15.9	06.1	67	62.5	24.0	17	109.3	41.9	67	155.9	59.9	17	202.6	77.8	67	249.3	95.7
18	16.8	06.5	68	63.5	24.4	18	110.2	42.3	68	156.9	60.2	18	203.5	78.1	68	250.2	96.1
19	17.7	06.8	69	64.4	24.7	19	111.1	42.6	69	157.8	60.6	19	204.4	78.5	69	251.1	96.4
20	18.7	07.2	70	65.3	25.1	20	112.1	43.0	70	158.7	60.9	20	205.4	78.8	70	252.1	96.8
21	19.6	07.5	71	66.3	25.4	121	113.0	43.4	171	159.7	61.3	221	206.3	79.2	271	253.0	97.1
22	20.5	07.9	72	67.2	25.8	22	113.9	43.7	72	160.6	61.6	22	207.2	79.6	72	253.9	97.5
23	21.5	08.2	73	68.1	26.2	23	114.8	44.1	73	161.5	62.0	23	208.2	79.9	73	254.9	97.8
24	22.4	08.6	74	69.1	26.5	24	115.8	44.4	74	162.5	62.4	24	209.1	80.3	74	255.8	98.2
25	23.3	09.0	75	70.0	26.9	25	116.7	44.8	75	163.4	62.7	25	210.0	80.6	75	256.7	98.6
26	24.3	09.3	76	70.9	27.2	126	117.7	45.2	176	164.3	63.1	226	211.0	81.0	276	257.7	98.9
27	25.2	09.7	77	71.8	27.6	27	118.6	45.5	77	165.3	63.4	27	211.9	81.4	77	258.6	99.3
28	26.1	10.0	78	72.8	28.0	28	119.5	45.9	78	166.2	63.8	28	212.8	81.7	78	259.5	99.6
29	27.1	10.4	79	73.7	28.3	29	120.5	46.2	79	167.1	64.2	29	213.8	82.1	79	260.5	100.0
30	28.0	10.8	80	74.7	28.7	30	121.4	46.6	80	168.1	64.5	30	214.7	82.4	80	261.4	100.4
31	28.9	11.1	81	75.6	29.0	131	122.3	47.0	181	169.0	64.9	231	215.6	82.8	281	262.3	100.7
32	29.9	11.5	82	76.5	29.4	32	123.3	47.3	82	169.9	65.2	32	216.6	83.1	82	263.3	101.1
33	30.0	11.8	83	77.5	29.7	33	124.2	47.7	83	170.9	65.6	33	217.5	83.5	83	264.2	101.4
34	31.7	12.2	84	78.4	30.1	34	125.1	48.0	84	171.8	65.9	34	218.4	83.9	84	265.1	101.8
35	32.7	12.5	85	79.3	30.5	35	126.1	48.4	85	172.7	66.3	35	219.4	84.2	85	266.1	102.1
36	33.6	12.9	86	80.3	30.8	136	127.0	48.7	186	173.7	66.7	236	220.3	84.6	286	267.0	102.5
37	34.5	13.3	87	81.2	31.2	37	127.9	49.1	87	174.6	67.0	37	221.2	84.9	87	267.9	102.9
38	35.5	13.6	88	82.1	31.5	38	128.9	49.5	88	175.5	67.4	38	222.2	85.3	88	268.9	103.3
39	36.4	14.0	89	83.1	31.9	39	129.8	49.8	89	176.5	67.7	39	223.1	85.7	89	269.8	103.6
40	37.3	14.3	90	84.0	32.3	40	130.7	50.2	90	177.4	68.1	40	224.1	86.0	90	270.7	103.9
41	38.3	14.7	91	84.9	32.6	141	131.7	50.5	191	178.3	68.5	241	225.0	86.4	291	271.7	104.3
42	39.2	15.1	92	85.9	33.0	42	132.6	50.9	92	179.3	68.8	42	225.9	86.7	92	272.6	104.7
43	40.1	15.4	93	86.8	33.3	43	133.5	51.3	93	180.2	69.2	43	226.9	87.1	93	273.5	105.0
44	41.1	15.8	94	87.7	33.7	44	134.5	51.6	94	181.1	69.5	44	227.8	87.4	94	274.5	105.4
45	42.0	16.1	95	88.7	34.0	45	135.4	52.0	95	182.1	69.9	45	228.7	87.8	95	275.4	105.7
46	42.9	16.5	96	89.6	34.4	146	136.3	52.3	196	183.0	70.2	246	229.7	88.2	296	276.3	106.1
47	43.9	16.8	97	90.5	34.8	47	137.3	52.7	97	183.9	70.6	47	230.6	88.5	97	277.3	106.4
48	44.8	17.2	98	91.5	35.1	48	138.2	53.0	98	184.9	71.0	48	231.5	88.9	98	278.2	106.8
49	45.7	17.6	99	92.4	35.5	49	139.1	53.4	99	185.8	71.3	49	232.5	89.2	99	279.1	107.2
50	46.7	17.9	100	93.4	35.8	150	140.1	53.8	200	186.7	71.7	250	233.4	89.6	300	280.1	107.7
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 69 Deg.

22 Difference of Latitude and Departure for 22 Deg.

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	00.9	00.4	51	47.3	19.1	101	93.6	37.8	151	140.0	56.6	201	186.4	75.3	251	232.7	94.0
2	01.9	00.7	52	48.2	19.5	02	94.6	38.2	52	140.5	56.9	02	187.3	75.7	52	233.7	94.4
3	02.8	01.1	53	49.1	19.9	03	95.5	38.6	53	141.9	57.3	03	188.2	76.0	53	234.6	94.8
4	03.7	01.5	54	50.1	20.2	04	96.4	39.0	54	142.8	57.7	04	189.1	76.4	54	235.5	95.2
5	04.6	01.9	55	51.0	20.6	05	97.4	39.3	55	143.7	58.1	05	190.1	76.8	55	236.4	95.5
6	05.6	02.2	56	51.9	21.0	106	98.3	39.7	156	144.6	58.4	206	191.0	77.2	256	237.4	95.9
7	06.5	02.6	57	52.9	21.4	07	99.2	40.1	57	145.0	58.8	07	191.9	77.5	57	238.3	96.3
8	07.4	03.0	58	53.8	21.7	08	100.1	40.5	58	146.5	59.2	08	192.9	77.9	58	239.2	96.6
9	08.3	03.4	59	54.7	22.1	09	101.1	40.8	59	147.4	59.6	09	193.8	78.3	59	240.1	97.0
10	09.3	03.7	60	55.6	22.5	10	102.0	41.2	60	148.4	59.9	10	194.7	78.7	60	241.1	97.4
11	10.2	04.1	61	56.6	22.9	111	102.9	41.6	161	149.3	60.3	211	195.6	79.0	261	242.0	97.8
12	11.1	04.5	62	57.5	23.2	12	103.8	42.0	62	150.2	60.7	12	196.6	79.4	62	242.9	98.1
13	12.1	04.9	63	58.4	23.6	13	104.8	42.3	63	151.1	61.1	13	197.5	79.8	63	243.9	98.5
14	13.0	05.2	64	59.3	24.0	14	105.7	42.7	64	152.1	61.4	14	198.4	80.2	64	244.8	98.9
15	13.9	05.6	65	60.3	24.3	15	106.6	43.1	65	153.0	61.8	15	199.3	80.5	65	245.7	99.3
16	14.8	06.0	66	61.2	24.7	116	107.6	43.5	166	153.9	62.2	216	200.3	80.9	266	246.6	99.6
17	15.8	06.4	67	62.1	25.1	17	108.5	43.8	67	154.8	62.6	17	201.2	81.3	67	247.6	100.0
18	16.7	06.7	68	63.0	25.5	18	109.4	44.2	68	155.8	62.9	18	202.1	81.7	68	248.5	100.4
19	17.6	07.1	69	64.0	25.8	19	110.3	44.6	69	156.7	63.3	19	203.1	82.0	69	249.4	100.8
20	18.5	07.5	70	64.9	26.2	20	111.3	45.0	70	157.6	63.7	20	204.0	82.4	70	250.3	101.1
21	19.5	07.9	71	65.8	26.6	121	112.2	45.3	171	158.6	64.1	221	204.9	82.8	271	251.3	101.5
22	20.4	08.2	72	66.8	27.0	22	113.1	45.7	72	159.5	64.4	22	205.8	83.2	72	252.2	101.9
23	21.3	08.6	73	67.7	27.3	23	114.0	46.1	73	160.4	64.8	23	206.7	83.5	73	253.1	102.3
24	22.3	09.0	74	68.6	27.7	24	115.0	46.5	74	161.3	65.2	24	207.7	83.9	74	254.1	102.6
25	23.2	09.4	75	69.5	28.1	25	115.9	46.8	75	162.3	65.6	25	208.6	84.3	75	255.0	103.0
26	24.1	09.7	76	70.5	28.5	126	116.8	47.2	176	163.2	65.9	226	209.5	84.7	276	255.9	103.4
27	25.0	10.1	77	71.4	28.8	27	117.8	47.6	77	164.1	66.3	27	210.5	85.0	77	256.8	103.8
28	26.0	10.5	78	72.3	29.2	28	118.7	47.9	78	165.0	66.7	28	211.4	85.4	78	257.8	104.1
29	26.9	10.9	79	73.2	29.6	29	119.6	48.3	79	166.0	67.1	29	212.3	85.8	79	258.7	104.5
30	27.8	11.2	80	74.2	30.0	30	120.5	48.7	80	166.9	67.4	30	213.3	86.2	80	259.6	104.9
31	28.7	11.6	81	75.1	30.3	131	121.5	49.1	181	167.8	67.8	231	214.2	86.5	281	260.5	105.3
32	29.7	12.0	82	76.0	30.7	32	122.4	49.4	82	168.8	68.2	32	215.1	86.9	82	261.5	105.6
33	30.6	12.4	83	77.0	31.1	33	123.3	49.8	83	169.7	68.6	33	216.0	87.3	83	262.4	106.0
34	31.5	12.7	84	77.9	31.5	34	124.2	50.2	84	170.6	68.9	34	217.0	87.7	84	263.3	106.4
35	32.5	13.1	85	78.8	31.8	35	125.1	50.6	85	171.5	69.3	35	217.9	88.0	85	264.3	106.8
36	33.4	13.5	86	79.7	32.2	136	126.1	50.9	186	172.5	69.7	236	218.8	88.4	286	265.2	107.1
37	34.3	13.9	87	80.7	32.6	37	127.0	51.3	87	173.4	70.1	37	219.7	88.8	87	266.1	107.5
38	35.2	14.2	88	81.6	33.0	38	128.0	51.7	88	174.3	70.4	38	220.7	89.2	88	267.0	107.9
39	36.2	14.6	89	82.5	33.3	39	128.9	52.1	89	175.2	70.8	39	221.6	89.5	89	268.0	108.3
40	37.1	15.0	90	83.4	33.7	40	129.8	52.4	90	176.2	71.2	40	222.5	89.9	90	268.9	108.6
41	38.0	15.4	91	84.4	34.1	141	130.7	52.8	191	177.1	71.5	241	223.5	90.3	291	269.8	109.0
42	38.9	15.7	92	85.3	34.5	42	131.7	53.2	92	178.0	71.9	42	224.4	90.7	92	270.7	109.4
43	39.9	16.1	93	86.2	34.8	43	132.6	53.6	93	178.9	72.3	43	225.3	91.0	93	271.7	109.8
44	40.8	16.5	94	87.2	35.2	44	133.5	53.9	94	179.8	72.7	44	226.2	91.4	94	272.6	110.1
45	41.7	16.9	95	88.1	35.6	45	134.4	54.3	95	180.8	73.0	45	227.2	91.8	95	273.5	110.5
46	42.7	17.2	96	89.0	36.0	146	135.4	54.7	196	181.7	73.4	246	228.1	92.2	296	274.5	110.9
47	43.6	17.6	97	89.9	36.3	47	136.3	55.1	97	182.7	73.8	47	229.0	92.5	97	275.4	111.3
48	44.5	18.0	98	90.9	36.7	48	137.2	55.4	98	183.6	74.2	48	229.9	92.9	98	276.3	111.6
49	45.4	18.4	99	91.8	37.1	49	138.2	55.8	99	184.5	74.5	49	230.9	93.3	99	277.2	112.0
50	46.4	18.7	100	92.7	37.5	150	139.1	56.2	200	185.4	74.9	250	231.8	93.7	300	278.2	112.4
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 68 Deg.

Difference of Latitude and Departure for 23 Deg. 23

Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep
1	00.9	00.4	51	46.9	19.9	101	93.0	39.5	151	139.0	59.0	201	185.0	78.5	251	231.0	98.1
2	01.8	00.8	52	47.9	20.3	02	93.9	39.9	52	139.9	59.4	02	185.9	78.9	52	232.0	98.5
3	02.8	01.2	53	48.8	20.7	03	94.8	40.2	53	140.8	59.8	03	186.9	79.3	53	232.9	98.8
4	03.7	01.6	54	49.7	21.1	04	95.7	40.6	54	141.8	60.2	04	187.8	79.7	54	233.8	99.2
5	04.6	02.0	55	50.6	21.5	05	96.7	41.0	55	142.7	60.6	05	188.7	80.1	55	234.7	99.6
6	05.5	02.3	56	51.5	21.9	106	97.6	41.4	156	143.6	60.9	206	189.6	80.5	256	235.6	100.0
7	06.4	02.7	57	52.5	22.3	07	98.5	41.8	57	144.5	61.3	07	190.5	80.9	57	236.6	100.4
8	07.4	03.1	58	53.4	22.7	08	99.4	42.2	58	145.4	61.7	08	191.5	81.3	58	237.5	100.8
9	08.3	03.5	59	54.3	23.1	09	100.3	42.6	59	146.4	62.1	09	192.4	81.7	59	238.4	101.2
10	09.2	03.9	60	55.2	23.4	10	101.3	43.0	60	147.3	62.5	10	193.3	82.0	60	239.3	101.6
11	10.1	04.3	61	56.1	23.8	111	102.2	43.4	161	148.2	62.9	211	194.2	82.4	261	240.2	102.0
12	11.0	04.7	62	57.1	24.2	12	103.1	43.8	62	149.1	63.3	12	195.1	82.8	62	241.2	102.4
13	12.0	05.1	63	58.0	24.6	13	104.0	44.1	63	150.0	63.7	13	196.1	83.3	63	242.1	102.8
14	12.9	05.5	64	58.9	25.0	14	104.9	44.5	64	151.0	64.1	14	197.0	83.6	64	243.0	103.1
15	13.8	05.9	65	59.8	25.4	15	105.9	44.9	65	151.9	64.5	15	197.9	84.0	65	243.9	103.5
16	14.7	06.3	66	60.8	25.8	116	106.8	45.3	66	152.8	64.9	216	198.8	84.4	266	244.9	103.9
17	15.6	06.6	67	61.7	26.2	17	107.7	45.7	67	153.7	65.2	17	199.7	84.8	67	245.8	104.3
18	16.6	07.0	68	62.6	26.6	18	108.6	46.1	68	154.6	65.6	18	200.7	85.2	68	246.7	104.7
19	17.5	07.4	69	63.5	27.0	19	109.5	46.5	69	155.6	66.0	19	201.6	85.6	69	247.6	105.1
20	18.4	07.8	70	64.4	27.3	20	110.5	46.9	70	156.5	66.4	20	202.5	86.0	70	248.5	105.5
21	19.3	08.2	71	65.4	27.7	121	111.4	47.3	171	157.4	66.8	221	203.4	86.3	271	249.5	105.9
22	20.3	08.6	72	66.3	28.1	22	112.3	47.7	72	158.3	67.2	22	204.4	86.7	72	250.4	106.3
23	21.2	09.0	73	67.2	28.5	23	113.2	48.1	73	159.2	67.6	23	205.3	87.1	73	251.3	106.7
24	22.1	09.4	74	68.1	28.9	24	114.1	48.4	74	160.2	68.0	24	206.2	87.5	74	252.2	107.1
25	23.0	09.8	75	69.0	29.3	25	115.1	48.8	75	161.1	68.4	25	207.1	87.9	75	253.1	107.4
26	23.9	10.2	76	70.0	29.7	126	116.0	49.2	176	162.0	68.8	226	208.0	88.3	276	254.1	107.8
27	24.8	10.5	77	70.9	30.1	27	116.9	49.6	77	162.9	69.2	27	209.0	88.7	77	255.0	108.2
28	25.8	10.9	78	71.8	30.5	28	117.8	50.0	78	163.8	69.5	28	209.9	89.1	78	255.9	108.6
29	26.7	11.3	79	72.7	30.9	29	118.7	50.4	79	164.8	69.9	29	210.8	89.5	79	256.8	109.0
30	27.6	11.7	80	73.6	31.3	30	119.7	50.8	80	165.7	70.3	30	211.7	89.9	80	257.7	109.4
31	28.5	12.1	81	74.6	31.6	131	120.6	51.2	181	166.6	70.7	231	212.6	90.3	281	258.7	109.8
32	29.5	12.5	82	75.5	32.0	32	121.5	51.6	82	167.5	71.1	32	213.6	90.6	82	259.6	110.2
33	30.4	12.9	83	76.4	32.4	33	122.4	52.0	83	168.5	71.5	33	214.5	91.0	83	260.5	110.6
34	31.3	13.3	84	77.3	32.8	34	123.3	52.4	84	169.4	71.9	34	215.4	91.4	84	261.4	111.0
35	32.2	13.7	85	78.2	33.2	35	124.3	52.7	85	170.3	72.3	35	216.3	91.8	85	262.3	111.3
36	33.1	14.1	86	79.2	33.6	136	125.2	53.1	186	171.2	72.7	236	217.2	92.2	286	263.3	111.7
37	34.1	14.5	87	80.1	34.0	37	126.1	53.5	87	172.1	73.1	37	218.2	92.6	87	264.2	112.1
38	35.0	14.8	88	81.0	34.4	38	127.0	53.9	88	173.1	73.5	38	219.1	93.0	88	265.1	112.5
39	35.9	15.2	89	81.9	34.8	39	127.9	54.3	89	174.0	73.8	39	220.0	93.4	89	266.0	112.9
40	36.8	15.6	90	82.8	35.2	40	128.9	54.7	90	174.9	74.2	40	220.9	93.8	90	266.9	113.3
41	37.7	16.0	91	83.8	35.6	141	129.8	55.1	191	175.8	74.6	241	221.8	94.2	291	267.9	113.7
42	38.7	16.4	92	84.7	35.9	42	130.7	55.5	92	176.7	75.0	42	222.8	94.5	92	268.8	114.1
43	39.6	16.8	93	85.6	36.3	43	131.6	55.9	93	177.7	75.4	43	223.7	94.9	93	269.7	114.5
44	40.5	17.2	94	86.5	36.7	44	132.6	56.3	94	178.6	75.8	44	224.6	95.3	94	270.6	114.9
45	41.4	17.6	95	87.4	37.1	45	133.5	56.7	95	179.5	76.2	45	225.5	95.7	95	271.5	115.3
46	42.3	18.0	96	88.4	37.5	146	134.4	57.0	196	180.4	76.6	246	226.4	96.1	296	272.5	115.6
47	43.3	18.4	97	89.3	37.9	47	135.3	57.4	97	181.3	77.0	47	227.4	96.5	97	273.4	116.0
48	44.2	18.8	98	90.2	38.3	48	136.2	57.8	98	182.3	77.4	48	228.3	96.9	98	274.3	116.4
49	45.1	19.1	99	91.1	38.7	49	137.2	58.2	99	183.2	77.7	49	229.2	97.3	99	275.2	116.8
50	46.0	19.5	100	92.0	39.1	50	138.1	58.6	200	184.1	78.1	250	230.1	97.7	300	276.2	117.2
Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat

for 67 Deg.

Difference of Latitude and Departure for 24 Deg.

Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep
1	00.9	00.4	51	46.6	20.7	101	92.3	41.1	151	137.9	61.4	201	183.6	81.7	251	229.3	102.1
2	01.8	00.8	52	47.5	21.1	02	93.2	41.5	52	138.9	61.8	02	184.5	82.2	52	230.2	102.5
3	02.7	01.2	53	48.4	21.6	03	94.1	41.9	53	139.8	62.2	03	185.4	82.6	53	231.1	102.9
4	03.7	01.6	54	49.3	22.0	04	95.0	42.3	54	140.7	62.6	04	186.4	83.0	54	232.0	103.3
5	04.6	02.0	55	50.2	22.4	05	95.9	42.7	55	141.6	63.0	05	187.3	83.4	55	232.9	103.7
6	05.5	02.4	56	51.2	22.8	106	96.8	43.1	156	142.5	63.4	206	188.2	83.8	256	233.9	104.1
7	06.4	02.8	57	52.1	23.2	07	97.7	43.5	57	143.4	63.9	07	189.1	84.2	57	234.8	104.5
8	07.3	03.3	58	53.0	23.6	08	98.7	43.9	58	144.3	64.3	08	190.0	84.6	58	235.7	104.9
9	08.2	03.7	59	53.9	24.0	09	99.6	44.3	59	145.2	64.7	09	190.9	85.0	59	236.6	105.3
10	09.1	04.1	60	54.8	24.4	10	100.5	44.7	60	146.1	65.1	10	191.8	85.4	60	237.5	105.7
11	10.0	04.5	61	55.7	24.8	111	101.4	45.1	161	147.1	65.5	211	192.7	85.8	261	238.4	106.1
12	11.0	04.9	62	56.6	25.2	12	102.3	45.6	62	148.0	65.9	12	193.7	86.2	62	239.3	106.6
13	11.9	05.3	63	57.6	25.6	13	103.2	46.0	63	148.9	66.3	13	194.6	86.6	63	240.3	107.0
14	12.8	05.7	64	58.5	26.0	14	104.1	46.4	64	149.8	66.7	14	195.5	87.0	64	241.2	107.4
15	13.7	06.1	65	59.4	26.4	15	105.1	46.8	65	150.7	67.1	15	196.4	87.4	65	242.1	107.8
16	14.6	06.5	66	60.3	26.8	116	106.0	47.2	66	151.6	67.5	216	197.3	87.8	266	243.0	108.2
17	15.5	06.9	67	61.2	27.2	17	106.9	47.6	67	152.6	67.9	17	198.2	88.3	67	243.9	108.6
18	16.4	07.3	68	62.1	27.7	18	107.8	48.0	68	153.5	68.3	18	199.1	88.7	68	244.8	109.0
19	17.4	07.7	69	63.0	28.1	19	108.7	48.4	69	154.4	68.7	19	200.1	89.1	69	245.7	109.4
20	18.3	08.1	70	63.9	28.5	20	109.6	48.8	70	155.3	69.1	20	201.0	89.5	70	246.6	109.8
21	19.2	08.5	71	64.9	28.9	121	110.5	49.2	171	156.2	69.5	221	201.9	89.9	271	247.6	110.2
22	20.1	08.9	72	65.8	29.3	2	111.4	49.6	72	157.1	70.0	22	202.8	90.3	72	248.5	110.6
23	21.0	09.4	73	66.7	29.7	23	112.4	50.0	73	158.0	70.4	23	203.7	90.7	73	249.4	111.0
24	21.9	09.8	74	67.6	30.1	24	113.3	50.4	74	158.9	70.8	24	204.6	91.1	74	250.3	111.4
25	22.8	10.2	75	68.5	30.5	5	114.2	50.8	75	159.9	71.2	25	205.5	91.5	75	251.2	111.8
26	23.8	10.6	76	69.4	30.9	126	115.1	51.2	176	160.8	71.6	226	206.5	91.9	276	252.1	112.2
27	24.7	11.0	77	70.3	31.3	27	116.0	51.7	77	161.7	72.0	27	207.4	92.3	77	253.0	112.7
28	25.6	11.4	78	71.3	31.7	28	116.9	52.1	78	162.6	72.4	28	208.3	92.7	78	254.0	113.1
29	26.5	11.8	79	72.2	32.1	29	117.8	52.5	79	163.5	72.8	29	209.2	93.1	79	254.9	113.5
30	27.4	12.2	80	73.1	32.5	30	118.8	52.9	80	164.4	73.2	30	210.1	93.5	80	255.8	113.9
31	28.3	12.6	81	74.0	32.9	131	119.7	53.3	181	165.3	73.6	231	211.0	93.9	281	256.7	114.3
32	29.2	13.0	82	74.9	33.3	32	120.6	53.7	82	166.3	74.0	32	211.9	94.4	82	257.6	114.7
33	30.1	13.4	83	75.8	33.8	33	121.5	54.1	83	167.2	74.4	33	212.8	94.8	83	258.5	115.1
34	31.1	13.8	84	76.7	34.2	34	122.4	54.5	84	168.1	74.8	34	213.8	95.2	84	259.4	115.5
35	32.0	14.2	85	77.6	34.6	35	123.3	54.9	85	169.0	75.2	35	214.7	95.6	85	260.3	115.9
36	32.9	14.6	86	78.6	35.0	136	124.2	55.3	186	169.9	75.6	236	215.6	96.0	286	261.3	116.3
37	33.8	15.0	87	79.5	35.4	37	125.1	55.7	87	170.8	76.1	37	216.5	96.4	87	262.2	116.7
38	34.7	15.5	88	80.4	35.8	38	126.1	56.1	88	171.7	76.5	38	217.4	96.8	88	263.1	117.1
39	35.6	15.9	89	81.3	36.2	39	127.0	56.5	89	172.7	76.9	39	218.3	97.2	89	264.0	117.5
40	36.5	16.3	90	82.2	36.6	40	127.9	56.9	90	173.6	77.3	40	219.2	97.6	90	264.9	117.9
41	37.5	16.7	91	83.1	37.0	141	128.8	57.3	191	174.5	77.7	241	220.2	98.0	291	265.8	118.3
42	38.4	17.1	92	84.0	37.4	42	129.7	57.8	92	175.4	78.1	42	221.1	98.4	92	266.7	118.8
43	39.3	17.5	93	85.0	37.8	43	130.6	58.2	93	176.3	78.5	43	222.0	98.8	93	267.7	119.2
44	40.2	17.9	94	85.9	38.2	44	131.5	58.6	94	177.2	78.9	44	222.9	99.2	94	268.6	119.6
45	41.1	18.3	95	86.8	38.6	45	132.5	59.0	95	178.1	79.3	45	223.8	99.6	95	269.5	120.0
46	42.0	18.7	96	87.7	39.0	146	133.4	59.4	196	179.0	79.7	246	224.7	100.0	296	270.4	120.4
47	42.9	19.1	97	88.6	39.4	47	134.3	59.8	97	180.0	80.1	47	225.6	100.5	97	271.3	120.8
48	43.8	19.5	98	89.5	39.8	48	135.2	60.2	98	180.9	80.5	48	226.5	100.9	98	272.2	121.2
49	44.8	19.9	99	90.4	40.3	49	136.1	60.6	99	181.8	80.9	49	227.5	101.3	99	273.1	121.6
50	45.7	20.3	100	91.4	40.7	150	137.0	60.0	00	182.7	81.3	250	228.4	101.7	300	274.1	122.0
Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat

for 66 Deg.

Difference of Latitude and Departure for 25 Deg. 25

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	00.0	00.4	51	46.2	21.6	101	91.5	42.7	151	136.9	63.8	201	182.2	84.9	251	227.5	106.1
2	01.8	00.8	52	47.1	22.0	02	92.4	43.1	52	137.8	64.2	02	183.1	85.4	52	228.4	106.5
3	02.7	01.3	53	48.0	22.4	03	93.3	43.5	53	138.7	64.7	03	184.0	85.8	53	229.3	106.9
4	03.6	01.7	54	48.9	22.8	04	94.2	44.0	54	139.6	65.1	04	184.9	86.2	54	230.2	107.3
5	04.5	02.1	55	49.8	23.2	05	95.1	44.4	55	140.5	65.5	05	185.8	86.6	55	231.1	107.8
6	05.4	02.5	56	50.8	23.7	106	96.1	44.8	156	141.4	65.9	206	186.7	87.1	256	232.0	108.2
7	06.3	03.0	57	51.7	24.1	07	97.0	45.2	57	142.3	66.3	07	187.6	87.5	57	232.9	108.6
8	07.3	03.4	58	52.6	24.5	08	97.9	45.6	58	143.2	66.8	08	188.5	87.9	58	233.8	109.0
9	08.2	03.8	59	53.5	24.9	09	98.8	46.1	59	144.1	67.2	09	189.4	88.3	59	234.7	109.5
10	09.1	04.2	60	54.4	25.4	10	99.7	46.5	60	145.0	67.6	10	190.3	88.7	60	235.6	109.9
11	10.0	04.6	61	55.3	25.8	111	100.6	46.9	161	145.9	68.0	211	191.2	89.2	261	236.5	110.3
12	10.9	05.0	62	56.2	26.2	12	101.5	47.3	62	146.8	68.5	12	192.1	89.6	62	237.5	110.7
13	11.8	05.5	63	57.1	26.6	13	102.4	47.8	63	147.7	68.9	13	193.0	90.0	63	238.4	111.1
14	12.7	05.9	64	58.0	27.0	14	103.3	48.2	64	148.6	69.3	14	193.9	90.4	64	239.3	111.6
15	13.6	06.3	65	58.9	27.5	15	104.2	48.6	65	149.5	69.7	15	194.9	90.9	65	240.2	112.0
16	14.5	06.8	66	59.8	27.9	116	105.1	49.0	66	150.4	70.2	216	195.8	91.3	266	241.1	112.4
17	15.4	07.2	67	60.7	28.3	17	106.0	49.4	67	151.4	70.6	17	196.7	91.7	67	242.0	112.8
18	16.3	07.6	68	61.6	28.7	18	106.9	49.9	68	152.3	71.0	18	197.6	92.1	68	242.9	113.3
19	17.2	08.0	69	62.5	29.2	19	107.8	50.3	69	153.2	71.4	19	198.5	92.5	69	243.8	113.7
20	18.1	08.5	70	63.4	29.6	20	108.8	50.7	70	154.1	71.8	20	199.4	93.0	70	244.7	114.1
21	19.0	08.9	71	64.3	30.0	121	109.7	51.1	171	155.0	72.3	221	200.3	93.4	271	245.6	114.5
22	19.9	09.3	72	65.3	30.4	22	110.6	51.6	72	155.9	72.7	22	201.2	93.8	72	246.5	114.9
23	20.8	09.7	73	66.2	30.8	23	111.5	52.0	73	156.8	73.1	23	202.1	94.2	73	247.4	115.4
24	21.8	10.1	74	67.1	31.3	24	112.4	52.4	74	157.7	73.5	24	203.0	94.7	74	248.3	115.8
25	22.7	10.6	75	68.0	31.7	25	113.3	52.8	75	158.6	74.0	25	203.9	95.1	75	249.2	116.2
26	23.6	11.0	76	68.9	32.1	126	114.2	53.2	176	159.5	74.4	226	204.8	95.5	276	250.1	116.6
27	24.5	11.4	77	69.8	32.5	27	115.1	53.7	77	160.4	74.8	27	205.7	95.9	77	251.0	117.1
28	25.4	11.8	78	70.7	33.0	28	116.0	54.1	78	161.3	75.2	28	206.6	96.4	78	252.0	117.5
29	26.3	12.3	79	71.6	33.4	29	116.9	54.5	79	162.2	75.6	29	207.5	96.8	79	252.9	117.9
30	27.2	12.7	80	72.5	33.8	30	117.8	54.9	80	163.1	76.1	30	208.4	97.2	80	253.8	118.3
31	28.1	13.1	81	73.4	34.2	131	118.7	55.4	181	164.0	76.5	231	209.4	97.6	281	254.7	118.8
32	29.0	13.5	82	74.3	34.7	32	119.6	55.8	82	164.9	76.9	32	210.3	98.0	82	255.6	119.2
33	29.9	13.9	83	75.2	35.1	33	120.5	56.2	83	165.9	77.3	33	211.2	98.5	83	256.5	119.6
34	30.8	14.4	84	76.1	35.5	34	121.4	56.6	84	166.8	77.8	34	212.1	98.9	84	257.4	120.0
35	31.7	14.8	85	77.0	35.9	35	122.4	57.1	85	167.7	78.2	35	213.0	99.3	85	258.3	120.4
36	32.6	15.2	86	77.9	36.3	136	123.3	57.5	186	168.6	78.6	236	213.9	99.7	286	259.2	120.9
37	33.5	15.6	87	78.8	36.8	37	124.2	57.9	87	169.5	79.0	37	214.8	100.2	87	260.1	121.3
38	34.4	16.1	88	79.8	37.2	38	125.1	58.3	88	170.4	79.4	38	215.7	100.6	88	261.0	121.7
39	35.3	16.5	89	80.7	37.6	39	126.0	58.7	89	171.3	79.9	39	216.6	101.0	89	261.9	122.1
40	36.3	16.9	90	81.6	38.0	40	126.9	59.2	90	172.2	80.3	40	217.5	101.4	90	262.8	122.6
41	37.2	17.3	91	82.5	38.5	141	127.8	59.6	191	173.1	80.7	241	218.4	101.8	291	263.7	123.0
42	38.1	17.7	92	83.4	38.9	42	128.7	60.0	92	174.0	81.1	42	219.3	102.3	92	264.6	123.4
43	39.0	18.2	93	84.3	39.3	43	129.6	60.4	93	174.9	81.6	43	220.2	102.7	93	265.5	123.8
44	39.9	18.6	94	85.2	39.7	44	130.5	60.9	94	175.8	82.0	44	221.1	103.1	94	266.5	124.2
45	40.8	19.1	95	86.1	40.1	45	131.4	61.3	95	176.7	82.4	45	222.0	103.5	95	267.4	124.7
46	41.7	19.4	96	87.0	40.6	146	132.3	61.7	196	177.6	82.8	246	222.9	104.0	296	268.3	125.1
47	42.6	19.9	97	87.9	41.0	47	133.2	62.1	97	178.5	83.3	47	223.9	104.4	97	269.2	125.5
48	43.5	20.3	98	88.8	41.4	48	134.1	62.5	98	179.4	83.7	48	224.8	104.8	98	270.1	125.9
49	44.4	20.7	99	89.7	41.8	49	135.0	63.0	99	180.4	84.1	49	225.7	105.2	99	271.0	126.4
50	45.3	21.1	100	90.6	42.3	150	135.9	63.4	200	181.3	84.5	50	226.6	105.7	300	271.9	126.8
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

391
130
651
521

for 65 Deg.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.9	00.4	51	45.8	22.4	101	90.8	44.3	151	135.7	66.2	201	180.7	88.1	251	225.6	110.0
2	01.8	00.9	52	46.7	22.8	02	91.7	44.7	52	136.6	66.6	02	181.6	88.6	52	226.5	110.5
3	02.7	01.3	53	47.6	23.2	03	92.6	45.2	53	137.5	67.1	03	182.5	89.0	53	227.4	110.9
4	03.6	01.8	54	48.5	23.7	04	93.5	45.6	54	138.4	67.5	04	183.4	89.4	54	228.3	111.4
5	04.5	02.2	55	49.4	24.1	05	94.4	46.0	55	139.3	68.0	05	184.3	89.9	55	229.2	111.8
6	05.4	02.6	56	50.3	24.6	06	95.3	46.5	56	140.2	68.4	06	185.2	90.3	56	230.1	112.2
7	06.3	03.1	57	51.2	25.0	07	96.2	46.9	57	141.1	68.8	07	186.1	90.7	57	231.0	112.7
8	07.2	03.5	58	52.1	25.4	08	97.1	47.3	58	142.0	69.3	08	187.0	91.2	58	231.9	113.1
9	08.1	03.9	59	53.0	25.9	09	98.0	47.8	59	142.9	69.7	09	187.8	91.6	59	232.8	113.5
10	09.0	04.4	60	53.9	26.3	10	98.9	48.2	60	143.8	70.1	10	188.7	92.1	60	233.7	114.0
11	09.9	04.8	61	54.8	26.7	11	99.8	48.7	61	144.7	70.6	11	189.6	92.5	61	234.6	114.4
12	10.8	05.3	62	55.7	27.2	12	100.7	49.1	62	145.6	71.0	12	190.5	92.9	62	235.5	114.9
13	11.7	05.7	63	56.6	27.6	13	101.6	49.5	63	146.5	71.5	13	191.4	93.4	63	236.4	115.3
14	12.6	06.1	64	57.5	28.1	14	102.5	50.0	64	147.4	71.9	14	192.3	93.8	64	237.3	115.7
15	13.5	06.6	65	58.4	28.5	15	103.4	50.4	65	148.3	72.3	15	193.2	94.3	65	238.2	116.2
16	14.4	07.0	66	59.3	28.9	16	104.3	50.9	66	149.2	72.8	16	194.1	94.7	66	239.1	116.6
17	15.3	07.5	67	60.2	29.4	17	105.2	51.3	67	150.1	73.2	17	195.0	95.1	67	240.0	117.1
18	16.2	07.9	68	61.1	29.8	18	106.1	51.7	68	151.0	73.7	18	195.9	95.6	68	240.9	117.5
19	17.1	08.3	69	62.0	30.2	19	107.0	52.2	69	151.9	74.1	19	196.8	96.0	69	241.8	117.9
20	18.0	08.7	70	62.9	30.7	20	107.9	52.6	70	152.8	74.5	20	197.7	96.4	70	242.7	118.4
21	18.9	09.2	71	63.8	31.1	21	108.8	53.0	71	153.7	75.0	21	198.6	96.9	71	243.6	118.8
22	19.8	09.6	72	64.7	31.6	22	109.7	53.5	72	154.6	75.4	22	199.5	97.3	72	244.5	119.2
23	20.7	10.1	73	65.6	32.0	23	110.6	53.9	73	155.5	75.8	23	200.4	97.8	73	245.4	119.7
24	21.6	10.5	74	66.5	32.4	24	111.5	54.4	74	156.4	76.3	24	201.3	98.2	74	246.3	120.1
25	22.5	11.0	75	67.4	32.9	25	112.4	54.8	75	157.3	76.7	25	202.2	98.6	75	247.2	120.6
26	23.4	11.4	76	68.3	33.3	26	113.2	55.2	76	158.2	77.2	26	203.1	99.1	76	248.1	121.0
27	24.3	11.8	77	69.2	33.8	27	114.1	55.7	77	159.1	77.6	27	204.0	99.5	77	249.0	121.4
28	25.2	12.3	78	70.1	34.2	28	115.0	56.1	78	160.0	78.0	28	204.9	100.0	78	249.9	121.9
29	26.1	12.7	79	71.0	34.6	29	115.9	56.6	79	160.9	78.5	29	205.8	100.4	79	250.8	122.3
30	27.0	13.2	80	71.9	35.1	30	116.8	57.0	80	161.8	78.9	30	206.7	100.8	80	251.7	122.8
31	27.9	13.6	81	72.8	35.5	31	117.7	57.4	81	162.7	79.4	31	207.6	101.3	81	252.6	123.2
32	28.8	14.0	82	73.7	35.9	32	118.6	57.9	82	163.6	79.8	32	208.5	101.7	82	253.5	123.6
33	29.7	14.5	83	74.6	36.4	33	119.5	58.3	83	164.5	80.2	33	209.4	102.1	83	254.4	124.1
34	30.6	14.9	84	75.5	36.8	34	120.4	58.7	84	165.4	80.7	34	210.3	102.6	84	255.3	124.5
35	31.5	15.3	85	76.4	37.3	35	121.3	59.2	85	166.3	81.1	35	211.2	103.0	85	256.2	124.9
36	32.4	15.8	86	77.3	37.7	36	122.2	59.6	86	167.2	81.5	36	212.1	103.5	86	257.1	125.4
37	33.3	16.2	87	78.2	38.1	37	123.1	60.1	87	168.1	82.0	37	213.0	103.9	87	258.0	125.8
38	34.2	16.7	88	79.1	38.6	38	124.0	60.5	88	169.0	82.4	38	213.9	104.3	88	258.9	126.3
39	35.1	17.1	89	80.0	39.0	39	124.9	61.9	89	169.9	82.9	39	214.8	104.8	89	259.8	126.7
40	36.0	17.5	90	80.9	39.5	40	125.8	61.4	90	170.8	83.3	40	215.7	105.2	90	260.7	127.1
41	36.9	18.0	91	81.8	39.9	41	126.7	61.8	91	171.7	83.7	41	216.6	105.7	91	261.6	127.6
42	37.7	18.4	92	82.7	40.3	42	127.6	62.3	92	172.6	84.2	42	217.5	106.1	92	262.4	128.0
43	38.6	18.9	93	83.6	40.8	43	128.5	62.7	93	173.5	84.6	43	218.4	106.5	93	263.3	128.5
44	39.5	19.3	94	84.5	41.2	44	129.4	63.1	94	174.4	85.0	44	219.3	107.0	94	264.2	128.9
45	40.4	19.7	95	85.4	41.6	45	130.3	63.6	95	175.3	85.5	45	220.2	107.4	95	265.1	129.3
46	41.3	20.2	96	86.3	42.1	46	131.2	64.0	96	176.2	85.9	46	221.1	107.8	96	266.0	129.8
47	42.2	20.6	97	87.2	42.5	47	132.1	64.4	97	177.1	86.4	47	222.0	108.3	97	266.9	130.2
48	43.1	21.0	98	88.2	43.0	48	133.0	64.9	98	178.0	86.8	48	222.9	108.7	98	267.8	130.6
49	44.0	21.5	99	89.0	43.4	49	133.9	65.3	99	178.9	87.2	49	223.8	109.2	99	268.7	131.1
50	44.9	21.9	100	89.9	43.8	50	134.8	65.8	100	179.8	87.7	50	224.7	109.6	100	269.6	131.5
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 64 Deg.

Difference of Latitude and Departure for 27 Deg.

27

Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep
1	00.9	00.5	51	45.4	23.2	101	90.0	45.9	151	134.5	68.6	201	179.1	91.3	251	223.6	114.0
2	01.8	00.9	52	46.3	23.6	02	90.9	46.3	52	135.4	69.0	02	180.0	91.7	52	224.5	114.4
3	02.7	01.4	53	47.2	24.1	03	91.8	46.8	53	136.3	69.5	03	180.9	92.2	53	225.4	114.9
4	03.6	01.8	54	48.1	24.5	04	92.7	47.2	54	137.2	70.0	04	181.8	92.6	54	226.3	115.3
5	04.5	02.3	55	49.0	25.0	05	93.6	47.7	55	138.1	70.4	05	182.7	93.1	55	227.2	115.8
6	05.3	02.7	56	49.9	25.4	106	94.4	48.1	156	139.0	70.8	206	183.5	93.5	256	228.1	116.2
7	06.2	03.2	57	50.8	25.9	07	95.3	48.6	57	139.9	71.3	07	184.4	94.0	57	229.0	116.7
8	07.1	03.6	58	51.7	26.3	08	96.2	49.0	58	140.8	71.7	08	185.3	94.4	58	229.9	117.1
9	08.0	04.1	59	52.6	26.8	09	97.1	49.5	59	141.7	72.2	09	186.2	94.9	59	230.8	117.6
10	08.9	04.5	60	53.5	27.2	10	98.0	49.9	60	142.6	72.6	10	187.1	95.3	60	231.7	118.0
11	09.8	05.0	61	54.4	27.7	111	98.9	50.4	161	143.5	73.1	211	188.0	95.8	261	232.6	118.5
12	10.7	05.4	62	55.2	28.1	12	99.8	50.8	62	144.3	73.5	12	188.9	96.2	62	233.4	118.9
13	11.6	05.9	63	56.1	28.6	13	100.7	51.3	63	145.2	74.0	13	189.8	96.7	63	234.3	119.4
14	12.5	06.4	64	57.0	29.1	14	101.6	51.8	64	146.1	74.5	14	190.7	97.2	64	235.2	119.9
15	13.4	06.8	65	57.9	29.5	15	102.5	52.2	65	147.0	74.9	15	191.6	97.6	65	236.1	120.3
16	14.3	07.3	66	58.8	30.0	116	103.4	52.7	166	147.9	75.4	216	192.5	98.1	266	237.0	120.8
17	15.1	07.7	67	59.7	30.4	17	104.2	53.1	67	148.8	75.8	17	193.3	98.5	67	237.9	121.2
18	16.0	08.2	68	60.6	30.9	18	105.1	53.6	68	149.7	76.3	18	194.2	99.0	68	238.8	121.7
19	16.9	08.6	69	61.5	31.3	19	106.0	54.0	69	150.6	76.7	19	195.1	99.4	69	239.7	122.1
20	17.8	09.1	70	62.4	31.8	20	106.9	54.5	70	151.5	77.2	20	196.0	99.9	70	240.6	122.6
21	18.7	09.5	71	63.3	32.2	121	107.8	54.9	171	152.4	77.6	221	196.9	100.3	271	241.5	123.3
22	19.6	10.0	72	64.2	32.7	22	108.7	55.4	72	153.3	78.1	22	197.8	100.8	72	242.4	123.5
23	20.5	10.4	73	65.0	33.1	23	109.6	55.8	73	154.1	78.5	23	198.7	101.2	73	243.2	123.9
24	21.4	10.9	74	65.9	33.6	24	110.5	56.3	74	155.0	79.0	24	199.6	101.7	74	244.1	124.4
25	22.3	11.4	75	66.8	34.1	25	111.4	56.8	75	155.9	79.5	25	200.5	102.2	75	245.0	124.9
26	23.2	11.8	76	67.7	34.5	126	112.3	57.2	176	156.8	79.9	226	201.4	102.6	276	245.9	125.3
27	24.1	12.3	77	68.6	35.0	27	113.2	57.7	77	157.7	80.4	27	202.3	103.1	77	246.8	125.8
28	24.9	12.7	78	69.5	35.4	28	114.0	58.1	78	158.6	80.8	28	203.1	103.5	78	247.7	126.2
29	25.8	13.2	79	70.4	35.9	29	114.9	58.6	79	159.5	81.3	29	204.0	104.0	79	248.6	126.7
30	26.7	13.6	80	71.3	36.3	30	115.8	59.0	80	160.4	81.7	30	204.9	104.4	80	249.5	127.1
31	27.6	14.1	81	72.2	36.8	131	116.7	59.5	181	161.3	82.2	231	205.8	104.9	281	250.4	127.6
32	28.5	14.5	82	73.1	37.2	32	117.6	59.9	82	162.2	82.6	32	206.7	105.3	82	251.3	128.0
33	29.4	15.0	83	74.0	37.7	33	118.5	60.4	83	163.1	83.1	33	207.6	105.8	83	252.2	128.5
34	30.3	15.4	84	74.8	38.1	34	119.4	60.8	84	163.9	83.5	34	208.5	106.2	84	253.0	128.9
35	31.2	15.9	85	75.7	38.6	35	120.3	61.3	85	164.8	84.0	35	209.4	106.7	85	253.9	129.4
36	32.1	16.3	86	76.6	39.5	136	121.2	61.7	186	165.7	84.4	236	210.3	107.1	286	254.8	129.8
37	33.0	16.8	87	77.5	39.0	37	122.1	62.2	87	166.6	84.9	37	211.2	107.6	87	255.7	130.3
38	33.9	17.3	88	78.4	40.4	38	123.0	62.7	88	167.5	85.4	38	212.1	108.1	88	256.6	130.8
39	34.7	17.7	89	79.3	40.9	39	123.8	63.1	89	168.4	85.8	39	212.9	108.5	89	257.5	131.2
40	35.6	18.2	90	80.2	40.3	40	124.7	63.6	90	169.3	86.3	40	213.8	109.0	90	258.4	131.7
41	36.5	18.6	91	81.1	41.3	141	125.6	64.0	191	170.2	86.7	241	214.7	109.4	291	259.3	132.1
42	37.4	19.1	92	82.0	41.8	42	126.5	64.5	92	171.1	87.2	42	215.6	109.9	92	260.2	132.6
43	38.3	19.5	93	82.9	42.2	43	127.4	64.9	93	172.0	87.6	43	216.5	110.3	93	261.1	133.0
44	39.2	20.0	94	83.8	42.7	44	128.3	65.4	94	172.9	88.1	44	217.4	110.8	94	262.0	133.5
45	40.1	20.4	95	84.6	43.1	45	129.2	65.8	95	173.7	88.5	45	218.3	111.2	95	262.8	133.9
46	41.0	20.9	96	85.5	43.6	146	130.1	66.3	196	174.6	89.0	246	219.2	111.7	296	263.7	134.4
47	41.9	21.3	97	86.4	44.0	47	131.0	66.7	97	175.5	89.4	47	220.1	112.1	97	264.6	134.8
48	42.8	21.8	98	87.3	44.5	48	131.9	67.2	98	176.4	89.9	48	221.0	112.6	98	265.5	135.3
49	43.7	22.2	99	88.2	44.9	49	132.8	67.6	99	177.3	90.3	49	221.9	113.0	99	266.4	135.7
50	44.6	22.7	100	89.1	45.4	150	133.7	68.1	200	178.2	90.8	250	222.8	113.5	300	267.3	136.2

for 63 Deg.

40.5
16.2
09.0
72.0

583
194
520
711

1023
342
090
540

58

Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep
1	01.9	00.5	51	45.0	23.9	101	89.2	47.4	151	133.3	70.9	201	177.5	94.4	251	221.6	117.8
2	01.8	00.9	52	45.9	24.4	02	90.1	47.9	52	134.2	71.4	02	178.4	94.8	52	222.5	118.3
3	02.6	01.4	53	46.8	24.9	03	90.9	48.4	53	135.1	71.8	03	179.2	95.3	53	223.4	118.8
4	03.5	01.9	54	47.7	25.4	04	91.8	48.8	54	136.0	72.3	04	180.1	95.8	54	224.3	119.2
5	04.4	02.3	55	48.6	25.8	05	92.7	49.3	55	136.9	72.8	05	181.0	96.2	55	225.2	119.7
6	05.3	02.8	56	49.4	26.3	06	93.6	49.8	56	137.7	73.2	06	181.9	96.7	56	226.0	120.2
7	06.2	03.3	57	50.3	26.8	07	94.5	50.2	57	138.6	73.7	07	182.8	97.2	57	226.9	120.7
8	07.1	03.8	58	51.2	27.2	08	95.4	50.7	58	139.5	74.2	08	183.7	97.7	58	227.8	121.1
9	07.9	04.2	59	52.1	27.7	09	96.2	51.2	59	140.4	74.6	09	184.5	98.1	59	228.7	121.6
10	08.8	04.7	60	53.0	28.2	10	97.1	51.6	60	141.3	75.1	10	185.4	98.6	60	229.6	122.1
11	09.7	05.2	61	53.9	28.6	11	98.0	52.1	61	142.2	75.6	11	186.3	99.1	61	230.5	122.5
12	10.6	05.6	62	54.7	29.1	12	98.9	52.6	62	143.0	76.1	12	187.2	99.5	62	231.3	123.0
13	11.5	06.1	63	55.6	29.6	13	99.8	53.1	63	143.9	76.5	13	188.1	100.0	63	232.2	123.5
14	12.4	06.6	64	56.5	30.0	14	100.7	53.5	64	144.8	77.0	14	189.0	100.5	64	233.1	123.9
15	13.2	07.0	65	57.4	30.5	15	101.5	54.0	65	145.7	77.5	15	189.8	100.9	65	234.0	124.4
16	14.1	07.5	66	58.3	31.0	16	102.4	54.5	66	146.6	77.9	16	190.7	101.4	66	234.9	124.9
17	15.0	08.0	67	59.2	31.5	17	103.3	54.9	67	147.5	78.4	17	191.6	101.9	67	235.8	125.4
18	15.9	08.5	68	60.0	31.9	18	104.2	55.4	68	148.3	78.9	18	192.5	102.4	68	236.6	125.8
19	16.8	08.9	69	60.9	32.4	19	105.1	55.9	69	149.2	79.3	19	193.4	102.8	69	237.5	126.3
20	17.7	09.4	70	61.8	32.9	20	106.0	56.3	70	150.1	79.8	20	194.3	103.3	70	238.4	126.8
21	18.5	09.9	71	62.7	33.3	21	106.8	56.8	71	151.0	80.3	21	195.1	103.8	71	239.3	127.2
22	19.4	10.3	72	63.6	33.8	22	107.7	57.3	72	151.9	80.8	22	196.0	104.2	72	240.2	127.7
23	20.3	10.8	73	64.5	34.3	23	108.6	57.7	73	152.8	81.2	23	196.9	104.7	73	241.1	128.2
24	21.2	11.4	74	65.3	34.7	24	109.5	58.2	74	153.6	81.7	24	197.8	105.2	74	241.9	128.6
25	22.1	11.7	75	66.2	35.2	25	110.4	58.7	75	154.5	82.2	25	198.7	105.6	75	242.8	129.1
26	23.0	12.2	76	67.1	35.7	26	111.3	59.2	76	155.4	82.6	26	199.6	106.1	76	243.7	129.6
27	23.8	12.7	77	68.0	36.2	27	112.1	59.6	77	156.3	83.1	27	200.4	106.6	77	244.6	130.1
28	24.7	13.1	78	68.9	36.6	28	113.0	60.1	78	157.2	83.6	28	201.3	107.0	78	245.5	130.5
29	25.6	13.6	79	69.8	37.1	29	113.9	60.6	79	158.1	84.0	29	202.2	107.5	79	246.4	131.0
30	26.5	14.1	80	70.6	37.6	30	114.8	61.0	80	158.9	84.5	30	203.1	108.0	80	247.2	131.5
31	27.4	14.6	81	71.5	38.0	31	115.7	61.5	81	159.8	85.0	31	204.0	108.5	81	248.1	131.9
32	28.3	15.0	82	72.4	38.5	32	116.6	62.0	82	160.7	85.4	32	204.9	108.9	82	249.0	132.4
33	29.1	15.5	83	73.3	39.0	33	117.4	62.4	83	161.6	85.9	33	205.7	109.4	83	249.9	132.9
34	30.0	16.0	84	74.2	39.4	34	118.3	62.9	84	162.5	86.4	34	206.6	109.9	84	250.8	133.3
35	30.9	16.4	85	75.1	39.9	35	119.2	63.4	85	163.4	86.9	35	207.5	110.3	85	251.7	133.8
36	31.8	16.9	86	75.9	40.4	36	120.1	63.9	86	164.2	87.3	36	208.4	110.8	86	252.5	134.3
37	32.7	17.4	87	76.8	40.8	37	121.0	64.3	87	165.1	87.8	37	209.3	111.3	87	253.4	134.7
38	33.6	17.8	88	77.7	41.3	38	121.9	64.8	88	166.0	88.3	38	210.2	111.7	88	254.3	135.2
39	34.4	18.3	89	78.6	41.8	39	122.7	65.3	89	166.9	88.7	39	211.0	112.2	89	255.2	135.7
40	35.3	18.8	90	79.5	42.3	40	123.6	65.7	90	167.8	89.2	40	211.9	112.7	90	256.1	136.1
41	36.2	19.2	91	80.4	42.7	41	124.5	66.2	91	168.7	89.7	41	212.8	113.1	91	257.0	136.6
42	37.1	19.7	92	81.2	43.2	42	125.4	66.7	92	169.5	90.1	42	213.7	113.6	92	257.8	137.1
43	38.0	20.2	93	82.1	43.7	43	126.3	67.1	93	170.4	90.6	43	214.6	114.1	93	258.7	137.6
44	38.9	20.7	94	83.0	44.1	44	127.2	67.6	94	171.3	91.1	44	215.5	114.6	94	259.6	138.0
45	39.7	21.1	95	83.9	44.6	45	128.0	68.1	95	172.2	91.6	45	216.3	115.0	95	260.5	138.5
46	40.6	21.6	96	84.8	45.1	46	128.9	68.5	96	173.1	92.0	46	217.2	115.5	96	261.4	139.0
47	41.5	22.1	97	85.7	45.5	47	129.8	69.0	97	174.0	92.5	47	218.1	115.9	97	262.3	139.4
48	42.4	22.5	98	86.5	46.0	48	130.7	69.5	98	174.8	93.0	48	219.0	116.4	98	263.1	139.9
49	43.3	23.0	99	87.4	46.5	49	131.6	70.0	99	175.7	93.4	49	219.9	116.9	99	264.0	140.4
50	44.2	23.5	100	88.3	47.0	50	132.5	70.4	100	176.6	93.9	50	220.8	117.4	100	264.9	140.9
Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat

for 62 Deg.

Difference of Latitude and Departure for 29 Deg.

29

216
72
612
57

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	00.9	00.5	51	44.6	24.7	101	88.3	49.0	151	132.1	73.2	201	175.8	97.4	251	219.5	121.7
2	01.7	01.0	52	45.5	25.2	02	89.2	49.4	52	132.9	73.7	02	176.7	97.9	52	220.4	122.2
3	02.6	01.5	53	46.4	25.7	03	90.1	49.9	53	133.8	74.2	03	177.5	98.4	53	221.3	122.7
4	03.5	01.9	54	47.2	26.2	04	91.0	50.4	54	134.7	74.7	04	178.4	98.9	54	222.2	123.1
5	04.4	02.4	55	48.1	26.7	05	91.8	50.9	55	135.6	75.1	05	179.3	99.4	55	223.0	123.6
6	05.2	02.9	56	49.0	27.1	06	92.7	51.4	56	136.4	75.6	06	180.2	99.9	56	223.9	124.1
7	06.1	03.4	57	49.9	27.6	07	93.6	51.9	57	137.3	76.1	07	181.0	100.4	57	224.8	124.6
8	07.0	03.9	58	50.7	28.1	08	94.5	52.4	58	138.2	76.6	08	181.9	100.8	58	225.6	125.1
9	07.9	04.4	59	51.6	28.6	09	95.3	52.8	59	139.1	77.1	09	182.8	101.3	59	226.5	125.6
10	08.7	04.8	60	52.5	29.1	10	96.2	53.3	60	139.9	77.6	10	183.7	101.8	60	227.4	126.0
11	09.6	05.3	61	53.4	29.6	11	97.1	53.8	61	140.8	78.1	11	184.5	102.3	61	228.3	126.5
12	10.5	05.8	62	54.2	30.1	12	98.0	54.3	62	141.7	78.5	12	185.4	102.8	62	229.1	127.0
13	11.4	06.3	63	55.1	30.5	13	98.8	54.8	63	142.6	79.0	13	186.3	103.3	63	230.0	127.5
14	12.2	06.8	64	56.0	31.0	14	99.7	55.3	64	143.4	79.5	14	187.2	103.7	64	230.9	128.0
15	13.1	07.3	65	56.8	31.5	15	100.6	55.8	65	144.3	80.0	15	188.0	104.2	65	231.8	128.5
16	14.0	07.8	66	57.7	32.0	16	101.5	56.2	66	145.2	80.5	16	188.9	104.7	66	232.6	129.0
17	14.9	08.2	67	58.6	32.5	17	102.3	56.7	67	146.1	81.0	17	189.8	105.2	67	233.5	129.4
18	15.7	08.7	68	59.5	33.0	18	103.2	57.2	68	146.9	81.4	18	190.7	105.7	68	234.4	129.9
19	16.6	09.2	69	60.3	33.5	19	104.1	57.7	69	147.8	81.9	19	191.5	106.2	69	235.3	130.4
20	17.5	09.7	70	61.2	33.9	20	105.0	58.2	70	148.7	82.4	20	192.4	106.7	70	236.1	130.9
21	18.4	10.2	71	62.1	34.4	21	105.8	58.7	71	149.6	82.9	21	193.3	107.1	71	237.0	131.4
22	19.2	10.7	72	63.0	34.9	22	106.7	59.1	72	150.4	83.4	22	194.2	107.6	72	237.9	131.9
23	20.1	11.2	73	63.8	35.4	23	107.6	59.6	73	151.3	83.9	23	195.0	108.1	73	238.8	132.4
24	21.0	11.6	74	64.7	35.9	24	108.5	60.1	74	152.2	84.4	24	195.9	108.6	74	239.6	132.8
25	21.9	12.1	75	65.6	36.4	25	109.3	60.6	75	153.1	84.8	25	196.8	109.1	75	240.5	133.3
26	22.7	12.6	76	66.5	36.8	26	110.2	61.1	76	153.9	85.3	26	197.7	109.6	76	241.4	133.8
27	23.6	13.1	77	67.3	37.3	27	111.1	61.6	77	154.8	85.8	27	198.5	110.0	77	242.3	134.3
28	24.5	13.6	78	68.2	37.8	28	111.9	62.1	78	155.7	86.3	28	199.4	110.5	78	243.1	134.8
29	25.4	14.1	79	69.1	38.3	29	112.8	62.5	79	156.6	86.8	29	200.3	111.0	79	244.0	135.3
30	26.2	14.5	80	70.0	38.8	30	113.7	63.0	80	157.4	87.3	30	201.2	111.5	80	244.9	135.7
31	27.1	15.0	81	70.8	39.3	31	114.6	63.5	81	158.3	87.7	31	202.0	112.0	81	245.8	136.2
32	28.0	15.5	82	71.7	39.8	32	115.4	64.0	82	159.2	88.2	32	202.9	112.5	82	246.6	136.7
33	28.9	16.0	83	72.6	40.2	33	116.3	64.5	83	160.1	88.7	33	203.8	113.0	83	247.5	137.2
34	29.7	16.5	84	73.5	40.7	34	117.2	65.0	84	160.9	89.2	34	204.7	113.4	84	248.4	137.7
35	30.6	17.0	85	74.3	41.2	35	118.1	65.4	85	161.8	89.7	35	205.5	113.9	85	249.3	138.2
36	31.5	17.5	86	75.2	41.7	36	118.9	65.9	86	162.7	90.2	36	206.4	114.4	86	250.1	138.7
37	32.4	17.9	87	76.1	42.2	37	119.8	66.4	87	163.6	90.7	37	207.3	114.9	87	251.0	139.1
38	33.2	18.4	88	77.0	42.7	38	120.7	66.9	88	164.4	91.1	38	208.2	115.4	88	251.9	139.6
39	34.1	18.9	89	77.8	43.1	39	121.6	67.4	89	165.3	91.6	39	209.0	115.9	89	252.8	140.1
40	35.0	19.4	90	78.7	43.6	40	122.4	67.9	90	166.2	92.1	40	209.9	116.4	90	253.6	140.6
41	35.9	19.9	91	79.6	44.1	41	123.3	68.4	91	167.0	92.6	41	210.8	116.8	91	254.5	141.1
42	36.7	20.4	92	80.5	44.6	42	124.2	68.8	92	167.9	93.1	42	211.7	117.3	92	255.4	141.6
43	37.6	20.8	93	81.3	45.1	43	125.1	69.3	93	168.8	93.6	43	212.5	117.8	93	256.3	142.0
44	38.5	21.3	94	82.2	45.6	44	125.9	69.8	94	169.7	94.1	44	213.4	118.3	94	257.1	142.5
45	39.4	21.8	95	83.1	46.1	45	126.8	70.3	95	170.5	94.5	45	214.3	118.8	95	258.0	143.0
46	40.2	22.3	96	84.0	46.5	46	127.7	70.8	96	171.4	95.0	46	215.2	119.3	96	258.9	143.5
47	41.1	22.8	97	84.8	47.0	47	128.6	71.3	97	172.3	95.5	47	216.0	119.7	97	259.8	144.0
48	42.0	23.3	98	85.7	47.5	48	129.4	71.8	98	173.2	96.0	48	216.9	120.2	98	260.6	144.5
49	42.9	23.8	99	86.6	48.0	49	130.3	72.2	99	174.0	96.5	49	217.8	120.7	99	261.5	145.0
50	43.7	24.2	100	87.5	48.5	50	131.2	72.7	100	174.9	97.0	50	218.7	121.2	100	262.4	145.4
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 61 Deg.

30 Difference of Latitude and Departure for 30 Deg.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.9	00.5	51	44.2	25.5	101	87.5	50.5	151	130.8	75.5	201	174.1	100.5	251	217.4	125.5
2	01.7	01.0	52	45.0	26.0	02	88.3	51.0	52	131.6	76.0	02	174.9	101.0	52	218.2	126.0
3	02.6	01.5	53	45.9	26.5	03	89.2	51.5	53	132.5	76.5	03	175.8	101.5	53	219.1	126.5
4	03.5	02.0	54	46.8	27.0	04	90.1	52.0	54	133.4	77.0	04	176.7	102.0	54	220.0	127.0
5	04.3	02.5	55	47.6	27.5	05	90.9	52.5	55	134.2	77.5	05	177.5	102.5	55	220.8	127.5
6	05.2	03.0	56	48.5	28.0	106	91.8	53.0	156	135.1	78.0	206	178.4	103.0	256	221.7	128.0
7	06.1	03.5	57	49.4	28.5	07	92.7	53.5	57	136.0	78.5	07	179.3	103.5	57	222.6	128.5
8	06.9	04.0	58	50.2	29.0	08	93.5	54.0	58	136.8	79.0	08	180.1	104.0	58	223.4	129.0
9	07.8	04.5	59	51.1	29.5	09	94.4	54.5	59	137.7	79.5	09	181.0	104.5	59	224.3	129.5
10	08.7	05.0	60	52.0	30.0	10	95.3	55.0	60	138.6	80.0	10	181.9	105.0	60	225.2	130.0
11	09.5	05.5	61	52.8	30.5	111	96.1	55.5	161	139.4	80.5	211	182.7	105.5	261	226.0	130.5
12	10.4	06.0	62	53.7	31.0	12	97.0	56.0	62	140.3	81.0	12	183.6	106.0	62	226.9	131.0
13	11.3	06.5	63	54.6	31.5	13	97.9	56.5	63	141.2	81.5	13	184.5	106.5	63	227.8	131.5
14	12.1	07.0	64	55.4	32.0	14	98.7	57.0	64	142.0	82.0	14	185.3	107.0	64	228.6	132.0
15	13.0	07.5	65	56.3	32.5	15	99.6	57.5	65	142.9	82.5	15	186.2	107.5	65	229.5	132.5
16	13.9	08.0	66	57.2	33.0	116	100.5	58.0	166	143.8	83.0	216	187.1	108.0	266	230.4	133.0
17	14.7	08.5	67	58.0	33.5	17	101.3	58.5	67	144.6	83.5	17	187.9	108.5	67	231.2	133.5
18	15.6	09.0	68	58.9	34.0	18	102.2	59.0	68	145.5	84.0	18	188.8	109.0	68	232.1	134.0
19	16.5	09.5	69	59.8	34.5	19	103.1	59.5	69	146.4	84.5	19	189.7	109.5	69	233.0	134.5
20	17.3	10.0	70	60.6	35.0	20	103.9	60.0	70	147.2	85.0	20	190.5	110.0	70	233.8	135.0
21	18.2	10.5	71	61.5	35.5	121	104.8	60.5	171	148.1	85.5	221	191.4	110.5	271	234.7	135.5
22	19.1	11.0	72	62.4	36.0	22	105.7	61.0	72	149.0	86.0	22	192.3	111.0	72	235.6	136.0
23	19.9	11.5	73	63.2	36.5	23	106.5	61.5	73	149.8	86.5	23	193.1	111.5	73	236.4	136.5
24	20.8	12.0	74	64.1	37.0	24	107.4	62.0	74	150.7	87.0	24	194.0	112.0	74	237.3	137.0
25	21.7	12.5	75	65.0	37.5	25	108.3	62.5	75	151.6	87.5	25	194.9	112.5	75	238.2	137.5
26	22.5	13.0	76	65.8	38.0	126	109.1	63.0	176	152.4	88.0	226	195.7	113.0	276	239.0	138.0
27	23.4	13.5	77	66.7	38.5	27	110.0	63.5	77	153.3	88.5	27	196.6	113.5	77	239.9	138.5
28	24.2	14.0	78	67.5	39.0	28	110.8	64.0	78	154.1	89.0	28	197.4	114.0	78	240.7	139.0
29	25.1	14.5	79	68.4	39.5	29	111.7	64.5	79	155.0	89.5	29	198.3	114.5	79	241.6	139.5
30	26.0	15.0	80	69.3	40.0	30	112.6	65.0	80	155.9	90.0	30	199.2	115.0	80	242.5	140.0
31	26.8	15.5	81	70.1	40.5	131	113.4	65.5	181	156.7	90.5	231	200.0	115.5	281	243.3	140.5
32	27.7	16.0	82	71.0	41.0	32	114.3	66.0	82	157.6	91.0	32	200.9	116.0	82	244.2	141.0
33	28.6	16.5	83	71.9	41.5	33	115.2	66.5	83	158.5	91.5	33	201.8	116.5	83	245.1	141.5
34	29.4	17.0	84	72.7	42.0	34	116.0	67.0	84	159.3	92.0	34	202.6	117.0	84	245.9	142.0
35	30.3	17.5	85	73.6	42.5	35	116.9	67.5	85	160.2	92.5	35	203.5	117.5	85	246.8	142.5
36	31.2	18.0	86	74.5	43.0	136	117.8	68.0	186	161.1	93.0	236	204.4	118.0	286	247.7	143.0
37	32.0	18.5	87	75.3	43.5	37	118.6	68.5	87	161.9	93.5	37	205.2	118.5	87	248.5	143.5
38	32.9	19.0	88	76.2	44.0	38	119.5	69.0	88	162.8	94.0	38	206.1	119.0	88	249.4	144.0
39	33.8	19.5	89	77.1	44.5	39	120.4	69.5	89	163.7	94.5	39	207.0	119.5	89	250.3	144.5
40	34.6	20.0	90	77.9	45.0	40	121.2	70.0	90	164.5	95.0	40	207.8	120.0	90	251.1	145.0
41	35.5	20.5	91	78.8	45.5	141	122.1	70.5	191	165.4	95.5	241	208.7	120.5	291	252.0	145.5
42	36.4	21.0	92	79.7	46.0	42	122.0	71.0	92	166.3	96.0	42	209.6	121.0	92	252.9	146.0
43	37.2	21.5	93	80.5	46.5	43	123.8	71.5	93	167.1	96.5	43	210.4	121.5	93	253.7	146.5
44	38.1	22.0	94	81.4	47.0	44	124.7	72.0	94	168.0	97.0	44	211.3	122.0	94	254.6	147.0
45	39.0	22.5	95	82.3	47.5	45	125.6	72.5	95	168.9	97.5	45	212.2	122.5	95	255.5	147.5
46	39.8	23.0	96	83.1	48.0	146	126.4	73.0	196	169.7	98.0	246	213.0	123.0	296	256.3	148.0
47	40.7	23.5	97	84.0	48.5	47	127.3	73.5	97	170.6	98.5	47	213.9	123.5	97	257.2	148.5
48	41.6	24.0	98	84.9	49.0	48	128.2	74.0	98	171.5	99.0	48	214.8	124.0	98	258.1	149.0
49	42.4	24.5	99	85.7	49.5	49	129.0	74.5	99	172.3	99.5	49	215.6	124.5	99	258.9	149.5
50	43.3	25.0	100	86.6	50.0	150	129.9	75.0	200	173.2	100.0	250	216.5	125.0	300	259.8	150.0
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 60 Deg.

Difference of Latitude and Departure for 31 Deg.

31

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	00.9	00.5	51	43.7	26.3	101	86.6	52.0	151	129	77.8	201	172.3	103.5	251	215.1	129.3
2	01.7	01.0	52	44.6	26.8	02	87.4	52.5	52	130.3	78.3	02	173.1	104.0	52	216.0	129.8
3	02.6	01.5	53	45.4	27.3	03	88.3	53.0	53	131.1	78.8	03	174.0	104.5	53	216.8	130.3
4	03.4	02.1	54	46.3	27.8	04	89.1	53.6	54	132.0	79.3	04	174.8	105.1	54	217.7	130.8
5	04.3	02.6	55	47.1	28.3	05	90.0	54.1	55	132.8	79.8	05	175.7	105.6	55	218.5	131.3
6	05.1	03.1	56	48.0	28.8	106	90.8	54.6	156	133.7	80.3	206	176.5	106.1	256	219.4	131.8
7	06.0	03.6	57	48.8	29.4	07	91.7	55.1	57	134.5	80.9	07	177.4	106.6	57	220.2	132.4
8	06.9	04.1	58	49.7	29.9	08	92.6	55.6	58	135.4	81.4	08	178.3	107.1	58	221.1	132.9
9	07.7	04.6	59	50.6	30.4	09	93.4	56.1	59	136.3	81.9	09	179.1	107.6	59	222.0	133.4
10	08.6	05.2	60	51.4	30.9	10	94.3	56.7	60	137.1	82.4	10	180.0	108.2	60	222.8	133.9
11	09.4	05.7	61	52.3	31.4	111	95.1	57.2	161	138.0	82.9	211	180.8	108.7	261	223.7	134.4
12	10.3	06.2	62	53.1	31.9	12	96.0	57.7	62	138.8	83.4	12	181.7	109.2	62	224.5	134.9
13	11.1	06.7	63	54.0	32.4	13	96.8	58.2	63	139.7	83.9	13	182.5	109.7	63	225.4	135.4
14	12.0	07.2	64	54.8	33.0	14	97.7	58.7	64	140.5	84.5	14	183.4	110.2	64	226.2	136.0
15	12.9	07.7	65	55.7	33.5	15	98.6	59.2	65	141.4	85.0	15	184.3	110.7	65	227.1	136.5
16	13.7	08.2	66	56.6	34.0	116	99.4	59.7	166	142.3	85.5	216	185.1	111.2	266	228.0	137.0
17	14.6	08.8	67	57.4	34.5	17	100.3	60.3	67	143.1	86.0	17	186.0	111.8	67	228.8	137.5
18	15.4	09.3	68	58.3	35.0	18	101.1	60.8	68	144.0	86.5	18	186.8	112.3	68	229.7	138.0
19	16.3	09.8	69	59.1	35.5	19	102.0	61.3	69	144.8	87.0	19	187.7	112.8	69	230.5	138.5
20	17.1	10.3	70	60.0	36.1	20	102.8	61.8	70	145.7	87.6	20	188.5	113.3	70	231.4	139.1
21	18.0	10.8	71	60.8	36.6	121	103.7	62.3	171	146.5	88.1	221	189.4	113.8	271	232.2	139.6
22	18.9	11.3	72	61.7	37.1	22	104.6	62.8	72	147.4	88.6	22	190.3	114.3	72	233.1	140.1
23	19.7	11.8	73	62.6	37.6	23	105.4	63.3	73	148.3	89.1	23	191.1	114.8	73	234.0	140.6
24	20.6	12.4	74	63.4	38.1	24	106.3	63.9	74	149.1	89.6	24	192.0	115.4	74	234.8	141.1
25	21.4	12.9	75	64.3	38.6	25	107.1	64.4	75	150.0	90.1	25	192.8	115.9	75	235.7	141.6
26	22.3	13.4	76	65.1	39.1	126	108.0	64.9	176	150.8	90.6	226	193.7	116.4	276	236.5	142.1
27	23.1	13.9	77	66.0	39.7	27	108.8	65.4	77	151.7	91.2	27	194.5	116.9	77	237.4	142.7
28	24.0	14.4	78	66.8	40.2	28	109.7	65.9	78	152.5	91.7	28	195.4	117.4	78	238.2	143.2
29	24.9	14.9	79	67.7	40.7	29	110.6	66.4	79	153.4	92.2	29	196.3	117.9	79	239.1	143.7
30	25.7	15.5	80	68.6	41.2	30	111.4	67.0	80	154.3	92.7	30	197.1	118.5	80	240.0	144.2
31	26.6	16.0	81	69.4	41.7	131	112.3	67.5	181	155.1	93.2	231	198.0	119.0	281	240.8	144.7
32	27.4	16.5	82	70.3	42.2	32	113.1	68.0	82	156.0	93.7	32	198.8	119.5	82	241.7	145.2
33	28.3	17.0	83	71.1	42.7	33	114.0	68.5	83	156.8	94.2	33	199.7	120.0	83	242.5	145.7
34	29.1	17.5	84	72.0	43.3	34	114.8	69.0	84	157.7	94.8	34	200.5	120.5	84	243.4	146.3
35	30.0	18.0	85	72.8	43.8	35	115.7	69.5	85	158.5	95.3	35	201.4	121.0	85	244.2	146.8
36	30.9	18.5	86	73.7	44.3	136	116.6	70.0	186	159.4	95.8	236	202.3	121.5	286	245.1	147.3
37	31.7	19.1	87	74.6	44.8	37	117.4	70.6	87	160.3	96.3	37	203.1	122.1	87	246.0	147.8
38	32.6	19.6	88	75.4	45.3	38	118.3	71.1	88	161.1	96.8	38	204.0	122.6	88	246.8	148.3
39	33.4	20.1	89	76.3	45.8	39	119.1	71.6	89	162.0	97.3	39	204.8	123.1	89	247.7	148.8
40	34.3	20.6	90	77.1	46.4	40	120.0	72.1	90	162.8	97.9	40	205.7	123.6	90	248.5	149.4
41	35.1	21.1	91	78.0	46.9	141	120.8	72.6	191	163.7	98.4	241	206.5	124.1	291	249.4	149.9
42	36.0	21.6	92	78.8	47.4	42	121.7	73.1	92	164.5	98.9	42	207.4	124.6	92	250.2	150.4
43	36.9	22.1	93	79.7	47.9	43	122.6	73.6	93	165.4	99.4	43	208.3	125.1	93	251.1	150.9
44	37.7	22.6	94	80.6	48.4	44	123.4	74.2	94	166.3	99.9	44	209.1	125.6	94	252.0	151.4
45	38.6	23.2	95	81.4	48.9	45	124.3	74.7	95	167.1	100.4	45	210.0	126.2	95	252.8	151.9
46	39.4	23.7	96	82.3	49.4	146	125.1	75.2	196	168.0	100.9	246	210.8	126.7	296	253.7	152.4
47	40.3	24.2	97	83.1	50.0	47	126.0	75.7	97	168.8	101.5	47	211.7	127.2	97	254.5	153.0
48	41.1	24.7	98	84.0	50.5	48	126.8	76.2	98	169.7	102.0	48	212.5	127.7	98	255.4	153.5
49	42.0	25.2	99	84.8	51.0	49	127.7	76.7	99	170.5	102.5	49	213.4	128.2	99	256.2	154.0
50	42.9	25.8	100	85.7	51.5	150	128.6	77.3	200	171.4	103.0	250	214.3	128.8	300	257.1	154.5
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 59 Deg.

32 Difference of Latitude and Departure for 32 Deg.

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	00.8	00.5	51	43.2	27.0	101	85.6	53.5	151	128.0	80.0	201	170.4	106.5	251	212.8	133.0
2	01.7	01.1	52	44.1	27.6	02	86.5	54.1	52	128.9	80.6	02	171.3	107.1	52	213.7	133.6
3	02.5	01.6	53	44.9	28.1	03	87.3	54.6	53	129.7	81.1	03	172.1	107.6	53	214.5	134.1
4	03.4	02.1	54	45.8	28.6	04	88.2	55.1	54	130.6	81.6	04	173.0	108.1	54	215.4	134.6
5	04.2	02.7	55	46.6	29.2	05	89.0	55.7	55	131.4	82.2	05	173.8	108.7	55	216.2	135.2
6	05.1	03.2	56	47.5	29.7	106	89.9	56.2	156	132.3	82.7	206	174.7	109.2	256	217.1	135.7
7	05.9	03.7	57	48.3	30.2	07	90.7	56.7	57	133.1	83.2	07	175.5	109.7	57	217.9	136.2
8	06.8	04.2	58	49.2	30.7	08	91.6	57.2	58	134.0	83.7	08	176.4	110.2	58	218.8	136.7
9	07.6	04.8	59	50.0	31.3	09	92.4	57.8	59	134.8	84.3	09	177.2	110.8	59	219.6	137.3
10	08.5	05.3	60	50.9	31.8	10	93.3	58.3	60	135.7	84.8	10	178.1	111.3	60	220.5	137.8
11	09.3	05.8	61	51.7	32.3	111	94.1	58.8	161	136.5	85.3	211	178.9	111.8	261	221.3	138.3
12	10.2	06.4	62	52.6	32.9	12	95.0	59.4	62	137.4	85.9	12	179.8	112.4	62	222.2	138.9
13	11.0	06.9	63	53.4	33.4	13	95.8	59.9	63	138.2	86.4	13	180.6	112.9	63	223.0	139.4
14	11.9	07.4	64	54.3	33.9	14	96.7	60.4	64	139.1	86.9	14	181.5	113.4	64	223.9	139.9
15	12.7	08.0	65	55.1	34.5	15	97.5	61.0	65	139.9	87.5	15	182.3	114.0	65	224.7	140.5
16	13.6	08.5	66	55.9	35.0	116	98.4	61.5	166	140.8	88.0	216	183.2	114.5	266	225.6	141.0
17	14.4	09.0	67	56.8	35.5	17	99.2	62.0	67	141.6	88.5	17	184.0	115.0	67	226.4	141.5
18	15.3	09.5	68	57.7	36.0	18	100.1	62.5	68	142.5	89.0	18	184.9	115.5	68	227.3	142.0
19	16.1	10.1	69	58.5	36.6	19	100.9	63.1	69	143.3	89.6	19	185.7	116.1	69	228.1	142.6
20	17.0	10.6	70	59.4	37.1	20	101.8	63.6	70	144.2	90.1	20	186.6	116.6	70	229.0	143.1
21	17.8	11.1	71	60.2	37.6	121	102.6	64.1	171	145.0	90.6	221	187.4	117.1	271	229.8	143.6
22	18.7	11.7	72	61.1	38.2	22	103.5	64.7	72	145.9	91.2	22	188.3	117.7	72	230.7	144.2
23	19.5	12.2	73	61.9	38.7	23	104.3	65.2	73	146.7	91.7	23	189.1	118.2	73	231.5	144.7
24	20.4	12.7	74	62.8	39.2	24	105.2	65.7	74	147.6	92.2	24	190.0	118.7	74	232.4	145.2
25	21.2	13.3	75	63.6	39.8	25	106.0	66.3	75	148.4	92.8	25	190.8	119.3	75	233.2	145.8
26	22.0	13.8	76	64.4	40.3	126	106.8	66.8	176	149.2	93.3	226	191.6	119.8	276	234.0	146.3
27	22.9	14.3	77	65.3	40.8	27	107.7	67.3	77	150.1	93.8	27	192.5	120.3	77	234.9	146.8
28	23.7	14.8	78	66.1	41.3	28	108.5	67.8	78	150.9	94.3	28	193.3	120.8	78	235.7	147.3
29	24.6	15.4	79	67.0	41.9	29	109.4	68.4	79	151.8	94.9	29	194.2	121.4	79	236.6	147.9
30	25.4	15.9	80	67.8	42.4	30	110.2	68.9	80	152.6	95.4	30	195.0	121.9	80	237.4	148.4
31	26.3	16.4	81	68.7	42.9	131	111.1	69.4	181	153.5	95.9	231	195.9	122.4	281	238.3	148.9
32	27.1	17.0	82	69.5	43.5	32	111.9	70.0	82	154.3	96.5	32	196.7	123.0	82	239.1	149.5
33	28.0	17.5	83	70.4	44.0	33	112.8	70.5	83	155.2	97.0	33	197.6	123.5	83	240.0	150.0
34	28.8	18.0	84	71.2	44.5	34	113.6	71.0	84	156.0	97.5	34	198.4	124.0	84	240.8	150.5
35	29.7	18.6	85	72.1	45.1	35	114.5	71.6	85	156.9	98.1	35	199.3	124.6	85	241.7	151.1
36	30.5	19.1	86	72.9	45.6	136	115.3	72.1	186	157.7	98.6	236	200.1	125.1	286	242.5	151.6
37	31.4	19.6	87	73.8	46.1	37	116.2	72.6	87	158.6	99.1	37	201.0	125.6	87	243.4	152.1
38	32.2	20.1	88	74.6	46.6	38	117.0	73.1	88	159.4	99.6	38	201.8	126.1	88	244.2	152.6
39	33.1	20.7	89	75.5	47.2	39	117.9	73.7	89	160.3	100.2	39	202.7	126.7	89	245.1	153.2
40	33.9	21.2	90	76.3	47.7	40	118.7	74.2	90	161.1	100.7	40	203.5	127.2	90	245.9	153.7
41	34.8	21.7	91	77.2	48.2	141	119.6	74.7	191	162.0	101.2	241	204.4	127.7	291	246.8	154.2
42	35.6	22.3	92	78.0	48.8	42	120.4	75.3	92	162.8	101.8	42	205.2	128.3	92	247.6	154.8
43	36.5	22.8	93	78.9	49.3	43	121.3	75.8	93	163.7	102.3	43	206.1	128.8	93	248.5	155.3
44	37.3	23.3	94	79.7	49.8	44	122.1	76.3	94	164.5	102.8	44	206.9	129.3	94	249.3	155.8
45	38.2	23.9	95	80.6	50.4	45	123.0	76.9	95	165.4	103.4	45	207.8	129.9	95	250.2	156.4
46	39.0	24.4	96	81.4	50.9	146	123.8	77.4	196	166.2	103.9	246	208.6	130.4	296	251.0	156.9
47	39.9	24.9	97	82.3	51.4	47	124.7	77.9	97	167.1	104.4	47	209.5	130.9	97	251.9	157.4
48	40.7	25.4	98	83.1	51.9	48	125.5	78.4	98	167.9	104.9	48	210.3	131.4	98	252.7	157.9
49	41.6	26.0	99	84.0	52.5	49	126.4	79.0	99	168.8	105.5	49	211.2	132.0	99	253.6	158.5
50	42.4	26.5	100	84.8	53.0	150	127.2	79.5	200	169.6	106.0	250	212.0	132.5	300	254.4	159.0
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 58 Deg.

Difference of Latitude and Departure for 33 Deg.

33

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.8	00.5	51	42.8	27.8	101	84.7	55.0	151	126.6	82.2	201	168.6	109.5	251	210.5	136.7
2	01.7	01.1	52	43.6	28.3	02	85.5	55.5	52	127.5	82.8	02	169.4	110.0	52	211.5	137.2
3	2.5	01.6	53	44.4	28.9	03	86.4	56.1	53	128.3	83.3	03	170.2	110.6	53	212.2	137.8
4	03.4	02.2	54	45.3	29.4	04	87.2	56.6	54	129.1	83.9	04	171.1	111.1	54	213.0	138.3
5	04.2	02.7	55	46.1	30.0	05	88.1	57.2	55	130.0	84.4	05	171.9	111.6	55	213.8	138.9
6	05.0	03.3	56	47.0	30.5	106	88.9	57.7	156	130.8	85.0	206	172.8	112.2	256	214.7	139.4
7	05.9	03.8	57	47.8	31.0	07	89.7	58.3	57	131.7	85.5	07	173.6	112.7	57	215.5	140.0
8	06.7	04.4	58	48.6	31.6	08	90.6	58.8	58	132.5	86.0	08	174.4	113.3	58	216.4	140.5
9	07.5	04.9	59	49.5	32.1	09	91.4	59.4	59	133.3	86.6	09	175.3	113.8	59	217.2	141.1
10	08.4	05.4	60	50.3	32.7	10	92.2	59.9	60	134.2	87.1	10	176.1	114.4	60	218.0	141.6
11	09.2	06.0	61	51.2	33.2	111	93.1	60.5	161	135.0	87.7	211	176.9	114.9	261	218.9	142.1
12	10.1	06.5	62	52.0	33.8	12	93.9	61.0	62	135.9	88.2	12	177.8	115.5	62	219.7	142.7
13	10.9	07.1	63	52.8	34.3	13	94.8	61.5	63	136.7	88.8	13	178.6	116.0	63	220.6	143.2
14	11.7	07.6	64	53.7	34.9	14	95.6	62.1	64	137.5	89.3	14	179.5	116.5	64	221.4	143.8
15	12.6	08.2	65	54.5	35.4	15	96.4	62.6	65	138.4	89.9	15	180.3	117.1	65	222.2	144.3
16	13.4	08.7	66	55.3	35.9	116	97.3	63.2	166	139.2	90.4	216	181.1	117.6	266	223.1	144.9
17	14.3	09.3	67	56.2	36.5	17	98.1	63.7	67	140.0	90.9	17	182.0	118.2	67	223.9	145.4
18	15.1	09.8	68	57.0	37.0	18	99.0	64.3	68	140.9	91.5	18	182.8	118.7	68	224.7	146.0
19	15.9	10.3	69	57.9	37.6	19	99.8	64.8	69	141.7	92.0	19	183.7	119.3	69	225.6	146.5
20	16.8	10.9	70	58.7	38.1	20	100.6	65.4	70	142.6	92.6	20	184.5	119.8	70	226.4	147.0
21	17.6	11.4	71	59.5	38.7	121	101.5	65.9	171	143.4	93.1	221	185.3	120.4	271	227.3	147.6
22	18.4	12.0	72	60.4	39.2	22	102.3	66.4	72	144.2	93.7	22	186.2	120.9	72	228.1	148.1
23	19.3	12.5	73	61.2	39.8	23	103.1	67.0	73	145.1	94.2	23	187.0	121.4	73	228.9	148.7
24	20.1	13.1	74	62.1	40.3	24	104.0	67.5	74	145.9	94.8	24	187.8	122.0	74	229.8	149.2
25	21.0	13.6	75	62.9	40.8	25	104.8	68.1	75	146.8	95.3	25	188.7	122.5	75	230.6	149.8
26	21.8	14.2	76	63.7	41.4	126	105.7	68.6	176	147.6	95.8	226	189.5	123.1	276	231.5	150.3
27	22.6	14.7	77	64.6	41.9	27	106.5	69.2	77	148.4	96.4	27	190.4	123.6	77	232.3	150.9
28	23.5	15.2	78	65.4	42.5	28	107.3	69.7	78	149.3	96.9	28	191.2	124.2	78	233.1	151.4
29	24.3	15.8	79	66.2	43.0	29	108.2	70.3	79	150.1	97.5	29	192.0	124.7	79	234.0	151.9
30	25.2	16.3	80	67.1	43.6	30	109.0	70.8	80	150.9	98.0	30	192.9	125.3	80	234.8	152.5
31	26.0	16.9	81	67.9	44.1	131	109.9	71.3	181	151.8	98.6	231	193.7	125.8	281	235.6	153.0
32	26.8	17.4	82	68.8	44.7	32	110.7	71.9	82	152.6	99.1	32	194.6	126.3	82	236.5	153.6
33	27.7	18.0	83	69.6	45.2	33	111.5	72.4	83	153.5	99.7	33	195.4	126.9	83	237.3	154.1
34	28.5	18.5	84	70.4	45.7	34	112.4	73.0	84	154.3	100.2	34	196.2	127.4	84	238.2	154.7
35	29.4	19.1	85	71.3	46.3	35	113.2	73.5	85	155.1	100.8	35	197.1	128.0	85	239.0	155.2
36	30.2	19.6	86	72.1	46.8	136	114.0	74.1	186	156.0	101.3	236	197.9	128.5	286	239.8	155.8
37	31.0	20.2	87	73.0	47.4	37	114.9	74.6	87	156.8	101.8	37	198.7	129.1	87	240.7	156.3
38	31.9	20.7	88	73.8	47.9	38	115.7	75.2	88	157.7	102.4	38	199.6	129.6	88	241.5	156.8
39	32.7	21.2	89	74.6	48.5	39	116.6	75.7	89	158.5	102.9	39	200.4	130.2	89	242.4	157.4
40	33.5	21.8	90	75.5	49.0	40	117.4	76.2	90	159.3	103.5	40	201.3	130.7	90	243.2	157.9
41	34.4	22.3	91	76.3	49.6	141	118.2	76.8	191	160.2	104.0	241	202.1	131.2	291	244.0	158.5
42	35.2	22.9	92	77.2	50.1	42	119.1	77.3	92	161.0	104.6	42	202.9	131.8	92	244.9	159.0
43	36.1	23.4	93	78.0	50.6	43	119.9	77.9	93	161.8	105.1	43	203.8	132.3	93	245.7	159.6
44	36.9	24.0	94	78.8	51.2	44	120.8	78.4	94	162.7	105.7	44	204.6	132.9	94	246.5	160.1
45	37.7	24.5	95	79.7	51.7	45	121.6	79.0	95	163.5	106.2	45	205.5	133.4	95	247.4	160.7
46	38.6	25.1	96	80.5	52.3	146	122.4	79.5	196	164.4	106.7	246	206.3	134.0	296	248.2	161.2
47	39.4	25.6	97	81.3	52.8	47	123.3	80.1	97	165.2	107.3	47	207.1	134.5	97	249.1	161.7
48	40.3	26.1	98	82.2	53.4	48	124.1	80.6	98	166.0	107.8	48	208.0	135.1	98	249.9	162.3
49	41.1	26.7	99	83.0	53.9	49	125.0	81.1	99	166.9	108.4	49	208.8	135.6	99	250.7	162.8
50	41.9	27.2	100	83.9	54.5	150	125.8	81.7	200	167.7	108.9	250	209.7	136.2	300	251.6	163.4
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 57 Deg.

34 Difference of Latitude and Departure for 34 Deg.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.8	00.6	51	42.3	28.5	101	83.7	56.5	151	125.2	84.4	201	166.6	112.4	251	208.1	140.4
2	01.7	01.1	52	43.1	29.1	02	84.6	57.0	52	126.0	85.0	02	167.5	113.0	52	208.9	140.9
3	02.5	01.7	53	43.9	29.6	03	85.4	57.6	53	126.8	85.6	03	168.3	113.5	53	209.7	141.5
4	03.3	02.2	54	44.8	30.2	04	86.2	58.2	54	127.7	86.1	04	169.1	114.1	54	210.6	142.0
5	04.1	02.8	55	45.6	30.8	05	87.0	58.7	55	128.5	86.7	05	169.9	114.6	55	211.4	142.6
6	05.0	03.4	56	46.4	31.3	106	87.9	59.3	156	129.3	87.2	206	170.8	115.2	256	212.2	143.2
7	05.8	03.9	57	47.3	31.9	07	88.7	59.8	57	130.2	87.8	07	171.6	115.8	57	213.1	143.7
8	06.6	04.5	58	48.1	32.4	08	89.5	60.4	58	131.0	88.4	08	172.4	116.3	58	213.9	144.3
9	07.5	05.0	59	48.9	33.0	09	90.4	61.0	59	131.8	88.9	09	173.3	116.9	59	214.7	144.8
10	08.3	05.6	60	49.7	33.6	10	91.2	61.5	60	132.6	89.5	10	174.1	117.4	60	215.5	145.4
11	09.1	06.1	61	50.6	34.1	111	92.0	62.1	161	133.5	90.0	211	174.9	118.0	261	216.4	146.0
12	09.9	06.7	62	51.4	34.7	12	92.8	62.6	62	134.3	90.6	12	175.7	118.6	62	217.2	146.5
13	10.8	07.3	63	52.2	35.2	13	93.7	63.2	63	135.1	91.1	13	176.6	119.1	63	218.0	147.1
14	11.6	07.8	64	53.1	35.8	14	94.5	63.7	64	136.0	91.7	14	177.4	119.7	64	218.9	147.6
15	12.4	08.4	65	53.9	36.3	15	95.3	64.3	65	136.8	92.3	15	178.2	120.2	65	219.7	148.2
16	13.3	08.9	66	54.7	36.9	116	96.2	64.9	166	137.0	92.8	216	179.1	120.8	266	220.5	148.7
17	14.1	09.5	67	55.5	37.5	17	97.0	65.4	67	138.4	93.4	17	179.9	121.3	67	221.3	149.2
18	14.9	10.1	68	56.4	38.0	18	97.8	66.0	68	139.3	93.9	18	180.7	121.9	68	222.2	149.9
19	15.8	10.6	69	57.2	38.6	19	98.7	66.5	69	140.1	94.5	19	181.6	122.5	69	223.0	150.4
20	16.6	11.2	70	58.0	39.1	20	99.5	67.1	70	140.9	95.1	20	182.4	123.0	70	223.8	151.0
21	17.4	11.7	71	58.9	39.7	121	100.3	67.7	171	141.8	95.6	221	183.2	123.6	271	224.7	151.5
22	18.2	12.3	72	59.7	40.3	22	101.1	68.2	72	142.6	96.2	22	184.0	124.1	72	225.5	152.1
23	19.1	12.9	73	60.5	40.8	23	102.0	68.8	73	143.4	96.7	23	184.9	124.7	73	226.3	152.7
24	19.9	13.4	74	61.3	41.4	24	102.8	69.3	74	144.2	97.3	24	185.7	125.3	74	227.1	153.2
25	20.7	14.0	75	62.2	41.9	25	103.6	69.9	75	145.1	97.9	25	186.5	125.8	75	228.0	153.8
26	21.6	14.5	76	63.0	42.5	126	104.5	70.5	176	145.9	98.4	226	187.4	126.4	276	228.8	154.3
27	22.4	15.1	77	63.8	43.1	27	105.3	71.0	77	146.7	99.0	27	188.2	126.9	77	229.6	154.9
28	23.2	15.7	78	64.7	43.6	28	106.1	71.6	78	147.6	99.5	28	189.0	127.5	78	230.5	155.5
29	24.0	16.2	79	65.5	44.2	29	106.9	72.1	79	148.4	100.1	29	189.8	128.1	79	231.3	156.0
30	24.9	16.8	80	66.3	44.7	30	107.8	72.7	80	149.2	100.7	20	190.7	128.6	80	232.1	156.6
31	25.7	17.3	81	67.1	45.3	131	108.6	73.3	181	150.0	101.2	231	191.5	129.2	281	232.9	157.1
32	26.5	17.9	82	68.0	45.9	32	109.4	73.8	82	150.9	101.8	32	192.3	129.7	82	233.8	157.7
33	27.4	18.5	83	68.8	46.4	33	110.3	74.4	83	151.7	102.3	33	193.2	130.3	83	234.6	158.3
34	28.2	19.0	84	69.6	47.0	34	111.1	74.9	84	152.5	102.9	34	194.0	130.9	84	235.4	158.8
35	29.0	19.6	85	70.5	47.5	35	111.9	75.5	85	153.4	103.5	35	194.8	131.4	85	236.3	159.4
36	29.8	20.1	86	71.3	48.1	136	112.7	76.1	186	154.2	104.0	236	195.6	132.0	286	237.1	159.9
37	30.7	20.7	87	72.1	48.7	37	113.6	76.6	87	155.0	104.6	37	196.5	132.5	87	237.9	160.5
38	31.5	21.2	88	73.0	49.2	38	114.4	77.2	88	155.9	105.1	38	197.3	133.1	88	238.8	161.0
39	32.3	21.8	89	73.8	49.8	39	115.2	77.7	89	156.7	105.7	39	198.1	133.6	89	239.6	161.6
40	33.2	22.4	90	74.6	50.3	40	116.1	78.3	90	157.5	106.2	40	199.0	134.2	90	240.4	162.2
41	34.0	22.9	91	75.4	50.9	141	116.9	78.8	191	158.3	106.8	241	199.8	134.8	291	241.2	162.7
42	34.8	23.5	92	76.3	51.4	42	117.7	79.4	92	159.2	107.4	42	200.6	135.3	92	242.1	163.3
43	35.6	24.0	93	77.1	52.0	43	118.5	80.0	93	160.0	107.9	43	201.4	135.9	93	242.9	163.8
44	36.5	24.6	94	77.9	52.6	44	119.4	80.5	94	160.8	108.5	44	202.3	136.4	94	243.7	164.4
45	37.3	25.2	95	78.8	53.1	45	120.2	81.1	95	161.7	109.0	45	203.1	137.0	95	244.6	165.0
46	38.1	25.7	96	79.6	53.7	146	121.0	81.6	196	162.5	109.6	246	203.9	137.6	296	245.4	165.5
47	39.0	26.3	97	80.4	54.2	47	121.9	82.2	97	163.3	110.2	47	204.8	138.1	97	246.2	166.1
48	39.8	26.8	98	81.2	54.8	48	122.7	82.8	98	164.1	110.7	48	205.6	138.7	98	247.0	166.6
49	40.6	27.4	99	82.1	55.4	49	123.5	83.3	99	165.0	111.3	49	206.4	139.2	99	247.9	167.2
50	41.5	28.0	100	82.9	55.9	150	124.4	83.9	200	165.8	111.8	250	207.3	139.8	300	248.7	167.8
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 56 Deg.

Difference of Latitude and Departure for 35 Deg.

35

Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep
1	00.8	00.6	51	41.8	29.2	101	82.7	57.9	151	123.7	86.6	201	164.6	115.3	251	205.6	143.9
2	01.6	01.1	52	42.6	29.8	02	83.5	58.5	52	124.5	87.2	02	165.4	115.8	52	206.4	144.5
3	02.5	01.7	53	43.4	30.4	03	84.4	59.1	53	125.3	87.7	03	166.3	116.4	53	207.2	145.1
4	03.3	02.3	54	44.2	31.0	04	85.2	59.6	54	126.1	88.3	04	167.1	117.0	54	208.0	145.7
5	04.1	02.9	55	45.0	31.5	05	86.0	60.2	55	126.9	88.9	05	167.9	117.6	55	208.8	146.2
6	04.9	03.4	56	45.9	32.1	106	86.8	60.8	156	127.8	89.5	206	168.7	118.1	256	209.6	146.8
7	05.7	04.0	57	46.7	32.7	07	87.6	61.4	57	128.6	90.0	07	169.5	118.7	57	210.5	147.4
8	06.6	04.6	58	47.5	33.3	08	88.5	61.9	58	129.4	90.6	08	170.3	119.3	58	211.3	148.0
9	07.4	05.2	59	48.3	33.8	09	89.3	62.5	59	130.2	91.2	09	171.2	119.9	59	212.1	148.5
10	08.2	05.7	60	49.1	34.4	10	90.1	63.1	60	131.0	91.8	10	172.0	120.4	60	212.9	149.1
11	09.0	06.3	61	50.0	35.0	111	90.9	63.7	161	131.9	92.3	211	172.8	121.0	261	213.8	149.7
12	09.8	06.9	62	50.8	35.6	12	91.7	64.2	62	132.7	92.9	12	173.6	121.6	62	214.6	150.3
13	10.6	07.6	63	51.6	36.1	13	92.5	64.8	63	133.5	93.5	13	174.4	122.2	63	215.4	150.8
14	11.5	08.0	64	52.4	36.7	14	93.4	65.4	64	134.3	94.1	14	175.3	122.7	64	216.2	151.4
15	12.3	08.6	65	53.2	37.3	15	94.2	66.0	65	135.1	94.6	15	176.1	123.3	65	217.0	152.0
16	13.1	09.2	66	54.1	37.9	116	95.0	66.5	166	136.0	95.2	216	176.9	123.9	266	217.8	152.6
17	13.9	09.7	67	54.9	38.4	17	95.8	67.1	67	136.8	95.8	17	177.7	124.4	67	218.7	153.1
18	14.7	10.3	68	55.7	39.0	18	96.6	67.7	68	137.6	96.3	18	178.5	125.0	68	219.5	153.7
19	15.6	10.9	69	56.5	39.6	19	97.5	68.2	69	138.4	96.9	19	179.4	125.6	69	220.3	154.3
20	16.4	11.5	70	57.3	40.1	20	98.3	68.8	70	139.2	97.5	20	180.2	126.2	70	221.1	154.8
21	17.2	12.0	71	58.1	40.7	121	99.1	69.4	171	140.0	98.1	221	181.0	126.7	271	221.9	155.4
22	18.0	12.6	72	59.0	41.3	22	99.9	70.0	72	140.9	98.6	22	181.8	127.3	72	222.8	156.0
23	18.8	13.2	73	59.8	41.9	23	100.7	70.5	73	141.7	99.2	23	182.6	127.9	73	223.6	156.6
24	19.6	13.8	74	60.6	42.4	24	101.6	71.1	74	142.5	99.8	24	183.5	128.5	74	224.4	157.1
25	20.5	14.3	75	61.4	43.0	25	102.4	71.7	75	143.3	100.4	25	184.3	129.0	75	225.2	157.7
26	21.3	14.9	76	62.2	43.6	126	103.2	72.3	176	144.1	100.9	226	185.1	129.6	276	226.0	158.3
27	22.1	15.5	77	63.1	44.2	27	104.0	72.8	77	145.0	101.5	27	185.9	130.2	77	226.9	158.9
28	22.9	16.1	78	63.9	44.7	28	104.8	73.4	78	145.8	102.1	28	186.7	130.8	78	227.7	159.4
29	23.8	16.6	79	64.7	45.3	29	105.6	74.0	79	146.6	102.7	29	187.5	131.3	79	228.5	160.0
30	24.6	17.2	80	65.5	45.9	30	106.5	74.6	80	147.4	103.2	30	188.4	131.9	80	229.3	160.6
31	25.4	17.8	81	66.3	46.5	131	107.3	75.1	181	148.2	103.8	231	189.2	132.5	281	230.1	161.2
32	26.2	18.4	82	67.2	47.0	32	108.1	75.7	82	149.1	104.4	32	190.0	133.1	82	231.0	161.7
33	27.0	18.9	83	68.0	47.6	33	108.9	76.3	83	149.9	105.0	33	190.8	133.6	83	231.8	162.3
34	27.8	19.5	84	68.8	48.2	34	109.7	76.8	84	150.7	105.5	34	191.6	134.2	84	232.6	162.9
35	28.7	20.1	85	69.6	48.7	35	110.6	77.4	85	151.5	106.1	35	192.5	134.8	85	233.4	163.4
36	29.5	20.6	86	70.4	49.3	136	111.4	78.0	186	152.3	106.7	236	193.3	135.3	286	234.2	164.0
37	30.3	21.2	87	71.3	49.9	37	112.2	78.6	87	153.1	107.2	37	194.1	135.9	87	235.0	164.6
38	31.1	21.8	88	72.1	50.5	38	113.0	79.1	88	154.0	107.8	38	194.9	136.5	88	235.9	165.2
39	31.9	22.4	89	72.9	51.0	39	113.8	79.7	89	154.8	108.4	39	195.7	137.1	89	236.7	165.7
40	32.8	22.9	90	73.7	51.6	40	114.6	80.3	90	155.6	109.0	40	196.6	137.6	90	237.5	166.3
41	33.6	23.5	91	74.5	52.2	141	115.5	80.9	191	156.4	109.5	241	197.4	138.2	291	238.3	166.9
42	34.4	24.1	92	75.3	52.8	42	116.3	81.4	92	157.2	110.1	42	198.2	138.8	92	239.1	167.5
43	35.2	24.7	93	76.2	53.3	43	117.1	82.0	93	158.1	111.7	43	199.0	139.4	93	240.0	168.0
44	36.0	25.2	94	77.0	53.9	44	117.9	82.6	94	158.9	111.3	44	199.8	139.9	94	240.8	168.6
45	36.9	25.8	95	77.8	54.5	45	118.8	83.2	95	159.7	112.8	45	200.6	140.5	95	241.6	169.2
46	37.7	26.4	96	78.6	55.1	146	119.6	83.7	196	160.5	112.4	246	201.5	141.1	296	242.4	169.8
47	38.5	27.0	97	79.4	55.6	47	120.4	84.3	97	161.3	113.0	47	202.3	141.7	97	243.2	170.3
48	39.3	27.5	98	80.3	56.2	48	121.2	84.9	98	162.2	113.6	48	203.1	142.2	98	244.1	170.9
49	40.1	28.1	99	81.1	56.8	49	122.0	85.5	99	163.0	114.1	49	203.9	142.8	99	244.9	171.5
50	41.0	28.7	100	81.9	57.4	150	122.8	86.0	200	163.8	114.7	250	204.7	143.4	300	245.7	172.1
Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat

for 55 Deg.

36 Difference of Latitude and Departure for 36 Deg.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.8	00.6	51	41.3	30.0	101	81.7	59.4	151	122.2	88.8	201	162.6	118.1	251	203.1	147.5
2	01.6	01.2	52	42.1	30.1	02	82.5	60.0	52	123.0	89.3	02	163.4	118.7	52	203.9	148.1
3	02.4	01.8	53	42.9	31.2	03	83.3	60.5	53	123.8	89.9	03	164.2	119.3	53	204.7	148.7
4	03.2	02.4	54	43.7	31.7	04	84.1	61.1	54	124.6	90.5	04	165.0	119.9	54	205.5	149.3
5	04.0	02.9	55	44.5	32.3	05	84.9	61.7	55	125.4	91.1	05	165.8	120.5	55	206.3	149.9
6	04.9	03.5	56	45.3	32.9	106	85.8	62.3	156	126.2	91.7	206	166.7	121.1	256	207.1	150.5
7	05.7	04.1	57	46.1	33.5	07	86.6	62.9	57	127.0	92.3	07	167.5	121.7	57	207.9	151.1
8	06.5	04.7	58	46.9	34.1	08	87.4	63.5	58	127.8	92.9	08	168.3	122.3	58	208.7	151.7
9	07.3	05.3	59	47.7	34.7	09	88.2	64.1	59	128.6	93.5	09	169.1	122.8	59	209.5	152.2
10	08.1	05.9	60	48.5	35.3	10	89.0	64.7	60	129.4	94.0	10	169.9	123.4	60	210.3	152.8
11	08.9	06.5	61	49.3	35.9	111	89.8	65.2	161	130.2	94.6	211	170.7	124.0	261	211.1	153.4
12	09.7	07.1	62	50.2	36.4	12	90.6	65.8	62	131.1	95.2	12	171.5	124.6	62	212.0	154.0
13	10.5	07.6	63	51.0	37.0	13	91.4	66.4	63	131.9	95.8	13	172.3	125.2	63	212.8	154.6
14	11.3	08.2	64	51.8	37.6	14	92.2	67.0	64	132.7	96.4	14	173.1	125.8	64	213.6	155.2
15	12.1	08.8	65	52.6	38.2	15	93.0	67.6	65	133.5	97.0	15	173.9	126.4	65	214.4	155.8
16	12.9	09.4	66	53.4	38.8	116	93.8	68.2	166	134.3	97.6	216	174.7	127.0	266	215.2	156.4
17	13.8	10.0	67	54.2	39.4	17	94.7	68.8	67	135.1	98.2	17	175.6	127.6	67	216.0	156.9
18	14.6	10.6	68	55.0	40.0	18	95.5	69.4	68	135.9	98.7	18	176.4	128.1	68	216.8	157.5
19	15.4	11.2	69	55.8	40.6	19	96.3	69.9	69	136.7	99.3	19	177.2	128.7	69	217.6	158.1
20	16.2	11.8	70	56.6	41.1	20	97.1	70.5	70	137.5	99.9	20	178.0	129.3	70	218.4	158.7
21	17.0	12.3	71	57.4	41.7	121	97.9	71.1	171	138.3	100.5	221	178.8	129.9	271	219.2	159.3
22	17.8	12.9	72	58.2	42.3	22	98.7	71.7	72	139.1	101.1	22	179.6	130.5	72	220.0	159.9
23	18.6	13.5	73	59.1	42.9	23	99.5	72.3	73	140.0	101.7	23	180.4	131.1	73	220.9	160.5
24	19.4	14.1	74	59.9	43.5	24	100.3	72.9	74	140.8	102.3	24	181.2	131.7	74	221.7	161.1
25	20.2	14.7	75	60.7	44.1	25	101.1	73.5	75	141.6	102.9	25	182.0	132.3	75	222.5	161.6
26	21.0	15.3	76	61.5	44.7	126	101.9	74.1	176	142.4	103.5	226	182.8	132.8	276	223.3	162.2
27	21.8	15.9	77	62.3	45.3	27	102.7	74.7	77	143.2	104.0	27	183.6	133.4	77	224.1	162.8
28	22.7	16.5	78	63.1	45.8	28	103.6	75.2	78	144.0	104.6	28	184.5	134.0	78	224.9	163.4
29	23.5	17.0	79	63.9	46.4	29	104.4	75.8	79	144.8	105.2	29	185.3	134.6	79	225.7	164.0
30	24.3	17.6	80	64.7	47.0	30	105.2	76.4	80	145.6	105.8	30	186.1	135.2	80	226.5	164.6
31	25.1	18.2	81	65.5	47.6	131	106.0	77.0	181	146.4	106.4	231	186.9	135.8	281	227.3	165.2
32	25.9	18.8	82	66.3	48.2	32	106.8	77.6	82	147.2	107.0	32	187.7	136.4	82	228.1	165.8
33	26.7	19.4	83	67.1	48.8	33	107.6	78.2	83	148.0	107.6	33	188.5	137.0	83	228.9	166.3
34	27.5	20.0	84	68.0	49.4	34	108.4	78.8	84	148.9	108.2	34	189.3	137.5	84	229.8	166.9
35	28.3	20.6	85	68.8	50.0	35	109.2	79.4	85	149.7	108.7	35	190.1	138.1	85	230.6	167.5
36	29.1	21.2	86	69.6	50.6	136	110.0	79.9	186	150.5	109.3	236	190.9	138.7	286	231.4	168.1
37	29.9	21.7	87	70.4	51.1	37	110.8	80.5	87	151.3	109.9	37	191.7	139.3	87	232.2	168.7
38	30.7	22.3	88	71.2	51.7	38	111.6	81.1	88	152.1	110.5	38	192.5	139.9	88	233.0	169.3
39	31.6	22.9	89	72.0	52.3	39	112.5	81.7	89	152.9	111.1	39	193.3	140.5	89	233.8	169.9
40	32.4	23.5	90	72.8	52.9	40	113.3	82.3	90	153.7	111.7	40	194.2	141.1	90	234.6	170.5
41	33.2	24.1	91	73.6	53.5	141	114.1	82.9	191	154.5	112.3	241	195.0	141.7	291	235.4	171.0
42	34.0	24.7	92	74.4	54.1	42	114.9	83.5	92	155.3	112.9	42	195.8	142.2	92	236.2	171.6
43	34.8	25.3	93	75.2	54.7	43	115.7	84.1	93	156.1	113.4	43	196.6	142.8	93	237.0	172.2
44	35.6	25.9	94	76.0	55.3	44	116.5	84.6	94	156.9	114.0	44	197.4	143.4	94	237.8	172.8
45	36.4	26.5	95	76.9	55.8	45	117.3	85.2	95	157.8	114.6	45	198.2	144.0	95	238.7	173.4
46	37.2	27.0	96	77.7	56.4	146	118.1	85.8	196	158.6	115.2	246	199.0	144.6	296	239.5	174.0
47	38.0	27.6	97	78.5	57.0	47	118.9	86.4	97	159.4	115.8	47	199.8	145.2	97	240.3	174.6
48	38.8	28.2	98	79.3	57.6	48	119.7	87.0	98	160.2	116.4	48	200.6	145.8	98	241.1	175.2
49	39.6	28.8	99	80.1	58.2	49	120.5	87.6	99	161.0	117.0	49	201.4	146.4	99	241.9	175.7
50	40.5	29.4	100	80.9	58.8	150	121.3	88.2	200	161.8	117.6	250	202.2	146.9	300	242.7	176.3
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 54 Deg.

Difference of Latitude and Departure for 37 Deg. 37

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	00.8	00.6	51	40.7	30.7	101	80.7	60.8	151	120.6	90.9	201	160.5	121.0	251	200.4	151.0
2	01.6	01.2	52	41.5	31.3	02	81.5	61.4	52	121.4	91.5	02	161.3	121.6	52	201.2	151.6
3	02.4	01.8	53	42.3	31.9	03	82.3	62.0	53	122.2	92.1	03	162.1	122.2	53	202.0	152.2
4	03.2	02.4	54	43.1	32.5	04	83.1	62.6	54	123.0	92.7	04	162.9	122.8	54	202.8	152.9
5	04.0	03.0	55	43.9	33.1	05	83.9	63.2	55	123.8	93.3	05	163.7	123.4	55	203.6	153.5
6	04.8	03.6	56	44.7	33.7	106	84.7	63.8	156	124.6	93.9	206	164.5	124.0	256	204.4	154.1
7	05.6	04.2	57	45.5	34.3	07	85.5	64.4	57	125.4	94.5	07	165.3	124.6	57	205.2	154.7
8	06.4	04.8	58	46.3	34.9	08	86.2	65.0	58	126.2	95.1	08	166.1	125.2	58	206.0	155.3
9	07.2	05.4	59	47.1	35.5	09	87.0	65.6	59	127.0	95.7	09	166.9	125.8	59	206.8	155.9
10	08.0	06.0	60	47.9	36.1	10	87.8	66.2	60	127.8	96.3	10	167.7	126.4	60	207.6	156.5
11	08.8	06.6	61	48.7	36.7	111	88.6	66.8	161	128.6	96.9	211	168.5	127.0	261	208.4	157.1
12	09.6	07.2	62	49.5	37.3	12	89.4	67.4	62	129.4	97.5	12	169.3	127.6	62	209.2	157.7
13	10.4	07.8	63	50.3	37.9	13	90.2	68.0	63	130.2	98.1	13	170.1	128.2	63	210.0	158.3
14	11.2	08.4	64	51.1	38.5	14	91.0	68.6	64	131.0	98.7	14	170.9	128.8	64	210.8	158.9
15	12.0	09.0	65	51.9	39.1	15	91.8	69.2	65	131.8	99.3	15	171.7	129.4	65	211.6	159.5
16	12.8	09.6	66	52.7	39.7	116	92.6	69.8	166	132.6	99.9	216	172.5	130.0	266	212.4	160.1
17	13.6	10.2	67	53.5	40.3	17	93.4	70.4	67	133.4	100.5	17	173.3	130.6	67	213.2	160.7
18	14.4	10.8	68	54.3	40.9	18	94.2	71.0	68	134.2	101.1	18	174.1	131.2	68	214.0	161.3
19	15.2	11.4	69	55.1	41.5	19	95.0	71.6	69	135.0	101.7	19	174.9	131.8	69	214.8	161.9
20	16.0	12.0	70	55.9	42.1	20	95.8	72.2	70	135.8	102.3	20	175.7	132.4	70	215.6	162.5
21	16.8	12.6	71	56.7	42.7	121	96.6	72.8	171	136.6	102.9	221	176.5	133.0	271	216.4	163.1
22	17.6	13.2	72	57.5	43.3	22	97.4	73.4	72	137.4	103.5	22	177.3	133.6	72	217.2	163.7
23	18.4	13.8	73	58.3	43.9	23	98.2	74.0	73	138.2	104.1	23	178.1	134.2	73	218.0	164.3
24	19.2	14.4	74	59.1	44.5	24	99.0	74.6	74	139.0	104.7	24	178.9	134.8	74	218.8	164.9
25	20.0	15.0	75	59.9	45.1	25	99.8	75.2	75	139.8	105.3	25	179.7	135.4	75	219.6	165.5
26	20.8	15.6	76	60.7	45.7	126	100.6	75.8	176	140.6	105.9	226	180.5	136.0	276	220.4	166.1
27	21.6	16.2	77	61.5	46.3	27	101.4	76.4	77	141.4	106.5	27	181.3	136.6	77	221.2	166.7
28	22.4	16.9	78	62.3	46.9	28	102.2	77.0	78	142.2	107.1	28	182.1	137.2	78	222.0	167.3
29	23.2	17.5	79	63.1	47.5	29	103.0	77.6	79	142.9	107.7	29	182.9	137.8	79	222.8	167.9
30	24.0	18.1	80	63.9	48.1	30	103.8	78.2	80	143.7	108.3	30	183.7	138.4	80	223.6	168.5
31	24.8	18.7	81	64.7	48.7	131	104.6	78.8	181	144.5	108.9	231	184.5	139.0	281	224.4	169.1
32	25.6	19.3	82	65.5	49.3	32	105.4	79.4	82	145.3	109.5	32	185.3	139.6	82	225.2	169.7
33	26.4	19.9	83	66.3	49.9	33	106.2	80.0	83	146.1	110.1	33	186.1	140.2	83	226.0	170.3
34	27.2	20.5	84	67.1	50.6	34	107.0	80.6	84	146.9	110.7	34	186.9	140.8	84	226.8	170.9
35	28.0	21.1	85	67.9	51.2	35	107.8	81.2	85	147.7	111.3	35	187.7	141.4	85	227.6	171.5
36	28.7	21.7	86	68.7	51.8	136	108.6	81.8	186	148.5	111.9	236	188.5	142.0	286	228.4	172.1
37	29.5	22.3	87	69.5	52.4	37	109.4	82.4	87	149.3	112.5	37	189.3	142.6	87	229.2	172.7
38	30.3	22.9	88	70.3	53.0	38	110.2	83.0	88	150.1	113.1	38	190.1	143.2	88	230.0	173.3
39	31.1	23.5	89	71.1	53.6	39	111.0	83.6	89	150.9	113.7	39	190.9	143.8	89	230.8	173.9
40	31.9	24.1	90	71.9	54.2	40	111.8	84.2	90	151.7	114.3	40	191.7	144.4	90	231.6	174.5
41	32.7	24.7	91	72.7	54.8	141	112.6	84.9	191	152.5	114.9	241	192.5	145.0	291	232.4	175.1
42	33.5	25.3	92	73.5	55.4	42	113.4	85.5	92	153.3	115.5	42	193.3	145.6	92	233.2	175.7
43	34.3	25.9	93	74.3	56.0	43	114.2	86.1	93	154.1	116.1	43	194.1	146.2	93	234.0	176.3
44	35.1	26.5	94	75.1	56.6	44	115.0	86.7	94	154.9	116.7	44	194.9	146.8	94	234.8	176.9
45	35.9	27.1	95	75.9	57.2	45	115.8	87.3	95	155.7	117.3	45	195.7	147.4	95	235.6	177.5
46	36.7	27.7	96	76.7	57.8	146	116.6	87.9	196	156.5	117.9	246	196.5	148.0	296	236.4	178.1
47	37.5	28.3	97	77.5	58.4	47	117.4	88.5	97	157.3	118.6	47	197.3	148.6	97	237.2	178.7
48	38.3	28.9	98	78.3	59.0	48	118.2	89.1	98	158.1	119.2	48	198.1	149.2	98	238.0	179.3
49	39.1	29.5	99	79.1	59.6	49	119.0	89.7	99	158.9	119.8	49	198.9	149.8	99	238.8	179.9
50	39.9	30.1	100	79.9	60.2	150	119.8	90.3	200	159.7	120.4	250	199.7	150.4	300	239.6	180.5
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 53 Deg.

420
142.

330
566
1104

214
3.34

11.84
69.14

57.40

1104
358

490
166
920
760

177
179

84

Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep
1	00.8	00.6	51	40.2	31.4	101	79.6	62.1	151	119.0	93.0	201	158.4	123.8	251	197.8	154.5
2	01.6	01.2	52	41.0	32.0	02	80.4	62.8	52	119.8	93.6	02	159.2	124.4	52	198.5	155.2
3	02.4	01.8	53	41.8	32.6	03	81.2	63.4	53	120.5	94.2	03	159.6	125.0	53	199.3	155.8
4	03.2	02.5	54	42.5	33.2	04	81.9	64.0	54	121.3	94.8	04	160.7	125.6	54	200.1	156.4
5	03.9	03.1	55	43.3	33.9	05	82.7	64.6	55	122.1	95.4	05	161.5	126.2	55	200.9	157.0
6	04.7	03.7	56	44.1	34.5	106	83.5	65.3	156	122.9	96.0	206	162.3	126.8	256	201.7	157.6
7	05.5	04.3	57	44.9	35.1	07	84.3	65.9	57	123.7	96.7	07	163.1	127.4	57	202.5	158.2
8	06.3	04.9	58	45.7	35.7	08	85.1	66.5	58	124.5	97.3	08	163.9	128.1	58	203.3	158.9
9	07.1	05.5	59	46.5	36.3	09	85.9	67.1	59	125.3	97.9	09	164.7	128.7	59	204.1	159.5
10	07.9	06.2	60	47.3	36.9	10	86.7	67.7	60	126.1	98.5	10	165.5	129.3	60	204.9	160.1
11	08.7	06.8	61	48.1	37.6	111	87.5	68.3	161	126.9	99.1	211	166.2	129.9	261	205.6	160.7
12	09.5	07.4	62	48.9	38.2	12	88.2	69.0	62	127.6	99.7	12	167.0	130.5	62	206.4	161.3
13	10.2	08.0	63	49.6	38.8	13	89.0	69.6	63	128.4	100.4	13	167.8	131.1	63	207.2	161.9
14	11.0	08.6	64	50.4	39.4	14	89.8	70.2	64	129.2	101.0	14	168.6	131.8	64	208.0	162.5
15	11.8	09.2	65	51.2	40.0	15	90.6	70.8	65	130.0	101.6	15	169.4	132.4	65	208.8	163.2
16	12.6	09.9	66	52.0	40.6	116	91.4	71.4	166	130.8	102.2	216	170.2	133.0	266	209.6	163.8
17	13.4	10.5	67	52.8	41.3	17	92.2	72.0	67	131.6	102.8	17	171.0	133.6	67	210.4	164.4
18	14.2	11.1	68	53.6	41.9	18	93.0	72.7	68	132.4	103.4	18	171.8	134.2	68	211.2	165.0
19	15.0	11.7	69	54.4	42.5	19	93.8	73.3	69	133.2	104.1	19	172.5	134.8	69	211.9	165.6
20	15.8	12.3	70	55.2	43.1	20	94.5	73.9	70	133.9	104.7	20	173.3	135.5	70	212.7	166.2
21	16.5	12.9	71	55.9	43.7	121	95.3	74.5	171	134.7	105.3	221	174.1	136.1	271	213.5	166.9
22	17.3	13.5	72	56.7	44.3	22	96.1	75.1	72	135.5	105.9	22	174.9	136.7	72	214.3	167.5
23	18.1	14.2	73	57.5	44.9	23	96.9	75.7	73	136.3	106.5	23	175.7	137.3	73	215.1	168.1
24	18.9	14.8	74	58.3	45.6	24	97.7	76.3	74	137.1	107.1	24	176.5	137.9	74	215.9	168.7
25	19.7	15.4	75	59.1	46.2	25	98.5	77.0	75	137.9	107.7	25	177.3	138.5	75	216.7	169.3
26	20.5	16.0	76	59.9	46.8	126	99.3	77.6	176	138.7	108.4	226	178.1	139.1	276	217.5	169.9
27	21.3	16.6	77	60.7	47.4	27	100.1	78.2	77	139.5	109.0	27	178.9	139.8	77	218.2	170.5
28	22.1	17.2	78	61.5	48.0	28	100.9	78.8	78	140.2	109.6	28	179.6	140.4	78	219.0	171.2
29	22.9	17.9	79	62.2	48.6	29	101.6	79.4	79	141.0	110.2	29	180.4	141.0	79	219.8	171.8
30	23.6	18.5	80	63.0	49.3	30	102.4	80.0	80	141.8	110.8	30	181.2	141.6	80	220.6	172.4
31	24.4	19.1	81	63.8	49.9	131	103.2	80.7	181	142.6	111.4	231	182.0	142.2	281	221.4	173.0
32	25.2	19.7	82	64.6	50.5	32	104.0	81.3	82	143.4	112.1	32	182.8	142.8	82	222.2	173.6
33	26.0	20.3	83	65.4	51.1	33	104.8	81.9	83	144.2	112.7	33	183.6	143.5	83	223.0	174.2
34	26.8	20.9	84	66.2	51.7	34	105.6	82.5	84	145.0	113.3	34	184.4	144.1	84	223.8	174.9
35	27.6	21.5	85	67.0	52.3	35	106.4	83.1	85	145.8	113.9	35	185.2	144.7	85	224.5	175.5
36	28.4	22.2	86	67.8	53.0	136	107.2	83.7	186	146.5	114.5	236	185.9	145.3	286	225.3	176.1
37	29.2	22.8	87	68.5	53.6	37	107.9	84.4	87	147.3	115.1	37	186.7	145.9	87	226.1	176.7
38	29.9	23.4	88	69.3	54.2	38	108.7	85.0	88	148.1	115.8	38	187.5	146.5	88	226.9	177.3
39	30.7	24.0	89	70.1	54.8	39	109.5	85.6	89	148.9	116.4	39	188.3	147.2	89	227.7	177.9
40	31.5	24.6	90	70.9	55.4	40	110.3	86.2	90	149.7	117.0	40	189.1	147.8	90	228.5	178.6
41	32.3	25.2	91	71.7	56.0	141	111.1	86.8	191	150.5	117.6	241	190.9	148.4	291	229.3	179.2
42	33.1	25.9	92	72.5	56.6	42	111.9	87.4	92	151.3	118.2	42	191.7	149.0	92	230.1	179.8
43	33.9	26.5	93	73.3	57.3	43	112.7	88.0	93	152.1	118.8	43	191.5	149.6	93	230.9	180.4
44	34.7	27.1	94	74.1	57.9	44	113.5	88.7	94	152.9	119.4	44	192.2	150.2	94	231.6	181.0
45	35.5	27.7	95	74.9	58.5	45	114.2	89.3	95	153.6	120.1	45	193.0	150.8	95	232.4	181.6
46	36.2	28.3	96	75.6	59.1	146	115.0	89.9	196	154.4	120.7	246	193.8	151.5	296	233.2	182.2
47	37.0	28.9	97	76.4	59.7	47	115.8	90.5	97	155.2	121.3	47	194.6	152.1	97	234.0	182.9
48	37.8	29.6	98	77.2	60.3	48	116.6	91.1	98	156.0	121.9	48	195.4	152.7	98	234.8	183.5
49	38.6	30.2	99	78.0	61.0	49	117.4	91.7	99	156.8	122.5	49	196.2	153.3	99	235.6	184.1
50	39.4	30.8	100	78.8	61.6	150	118.2	92.4	200	157.6	123.1	250	197.0	153.9	300	236.4	184.7
Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat

for 52 Deg.

Difference of Latitude and Departure for 39 Deg.

39

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.8	00.6	51	39.6	32.1	101	78.5	63.6	151	117.5	95.0	201	156.2	126.5	251	195.1	158.0
2	01.6	01.3	52	40.4	32.7	02	79.3	64.2	52	118.1	95.7	02	157.0	127.1	52	195.8	158.6
3	02.3	01.9	53	41.2	33.4	03	80.0	64.8	53	118.9	96.3	03	157.8	127.7	53	196.6	159.2
4	03.1	02.5	54	42.0	34.0	04	80.8	65.4	54	119.7	96.9	04	158.5	128.4	54	197.4	159.8
5	03.9	03.1	55	42.7	34.6	05	81.6	66.1	55	120.5	97.5	05	159.3	129.0	55	198.2	160.5
6	04.7	03.8	56	43.5	35.2	106	82.4	66.7	156	121.2	98.2	206	160.1	129.6	256	198.9	161.1
7	05.4	04.4	57	44.3	35.9	07	83.1	67.3	57	122.0	98.8	07	160.9	130.3	57	199.7	161.7
8	06.2	05.0	58	45.1	36.5	08	83.9	68.0	58	122.8	99.4	08	161.6	130.9	58	200.5	162.4
9	07.0	05.7	59	45.8	37.1	09	84.7	68.6	59	123.6	100.1	09	162.4	131.5	59	201.3	163.0
10	07.8	06.3	60	46.6	37.8	10	85.5	69.2	60	124.3	100.7	10	163.2	132.2	60	202.0	163.6
11	08.5	06.9	61	47.4	38.4	111	86.3	69.9	161	125.1	101.3	211	164.0	132.8	261	202.8	164.2
12	09.3	07.6	62	48.2	39.0	12	87.0	70.5	62	125.9	101.9	12	164.7	133.4	62	203.6	164.9
13	10.1	08.2	63	49.0	39.6	13	87.8	71.1	63	126.7	102.6	13	165.5	134.0	63	204.4	165.5
14	10.9	08.8	64	49.7	40.3	14	88.6	71.7	64	127.4	103.2	14	166.3	134.7	64	205.2	166.1
15	11.7	09.4	65	50.5	40.9	15	89.4	72.4	65	128.2	103.8	15	167.1	135.3	65	205.9	166.8
16	12.4	10.1	66	51.3	41.5	116	90.1	73.0	166	129.0	104.5	216	167.9	135.9	266	206.7	167.4
17	13.2	10.7	67	52.1	42.2	17	90.9	73.6	67	129.8	105.1	17	168.6	136.6	67	207.5	168.0
18	14.0	11.3	68	52.8	42.8	18	91.7	74.3	68	130.6	105.7	18	169.4	137.2	68	208.3	168.7
19	14.8	12.0	69	53.6	43.4	19	92.5	74.9	69	131.3	106.4	19	170.2	137.8	69	209.0	169.3
20	15.5	12.6	70	54.4	44.1	20	93.3	75.5	70	132.1	107.0	20	171.0	138.4	70	209.8	169.9
21	16.3	13.2	71	55.2	44.7	121	94.0	76.1	171	132.9	107.6	221	171.7	139.1	271	210.6	170.5
22	17.1	13.8	72	56.0	45.3	22	94.8	76.8	72	133.7	108.2	22	172.5	139.7	72	211.4	171.2
23	17.9	14.5	73	56.7	45.9	23	95.6	77.4	73	134.4	108.9	23	173.3	140.3	73	212.1	171.8
24	18.7	15.1	74	57.5	46.6	24	96.4	78.0	74	135.2	109.5	24	174.1	141.0	74	212.9	172.4
25	19.4	15.7	75	58.3	47.0	25	97.1	78.7	75	136.0	110.1	25	174.8	141.6	75	213.7	173.1
26	20.2	16.4	76	59.1	47.8	126	97.9	79.3	176	136.8	110.8	226	175.6	142.2	276	214.5	173.7
27	21.0	17.0	77	59.8	48.5	27	98.7	79.9	77	137.5	111.4	27	176.4	142.9	77	215.3	174.3
28	21.8	17.6	78	60.6	49.1	28	99.5	80.6	78	138.3	112.0	28	177.2	143.5	78	216.0	174.9
29	22.5	18.2	79	61.4	49.7	29	100.2	81.2	79	139.1	112.6	29	178.0	144.1	79	216.8	175.6
30	23.3	18.9	80	62.2	50.3	30	101.0	81.8	80	139.9	113.3	30	178.7	144.7	80	217.6	176.2
31	24.1	19.5	81	62.9	51.0	131	101.8	82.4	181	140.7	113.9	231	179.5	145.4	281	218.4	176.8
32	24.9	20.1	82	63.7	51.6	32	102.6	83.1	82	141.4	114.5	32	180.3	146.0	82	219.1	177.5
33	25.6	20.8	83	64.5	52.2	33	103.4	83.7	83	142.2	115.2	33	181.1	146.6	83	219.9	178.1
34	26.4	21.4	84	65.3	52.9	34	104.1	84.3	84	143.0	115.8	34	181.8	147.3	84	220.7	178.7
35	27.2	22.0	85	66.1	53.5	35	104.9	85.0	85	143.8	116.4	35	182.6	147.9	85	221.5	179.4
36	28.0	22.7	86	66.8	54.1	136	105.7	85.6	186	144.5	117.1	236	183.4	148.5	286	222.3	180.0
37	28.8	23.3	87	67.6	54.7	37	106.5	86.2	87	145.3	117.7	37	184.2	149.1	87	223.0	180.6
38	29.5	23.9	88	68.4	55.4	38	107.2	86.8	88	146.1	118.3	38	185.0	149.8	88	223.8	181.2
39	30.3	24.5	89	69.2	56.0	39	108.0	87.5	89	146.9	118.9	39	185.7	150.4	89	224.6	181.9
40	31.1	25.2	90	69.9	56.6	40	108.8	88.1	90	147.0	119.6	40	186.5	151.0	90	225.4	182.5
41	31.9	25.8	91	70.7	57.3	141	109.6	88.7	191	148.4	120.0	241	187.3	151.7	291	226.1	183.1
42	32.6	26.4	92	71.5	57.9	42	110.3	89.4	92	149.2	120.8	42	188.1	152.3	92	226.9	183.8
43	33.4	27.1	93	72.3	58.5	43	111.1	90.0	93	150.0	121.5	43	188.8	152.9	93	227.7	184.4
44	34.2	27.7	94	73.0	59.2	44	111.9	90.6	94	150.8	122.1	44	189.6	153.6	94	228.5	185.0
45	35.0	28.3	95	73.8	59.8	45	112.7	91.2	95	151.5	122.7	45	190.4	154.2	95	229.2	185.6
46	35.7	28.9	96	74.6	60.4	146	113.5	91.9	196	152.3	123.3	246	191.2	154.8	296	230.0	186.3
47	36.5	29.6	97	75.4	61.0	47	114.2	92.5	97	153.1	124.0	47	191.9	155.4	97	230.8	186.9
48	37.3	30.2	98	76.2	61.7	48	115.0	93.1	98	153.9	124.6	48	192.7	156.1	98	231.6	187.5
49	38.1	30.8	99	76.9	62.3	49	115.8	93.8	99	154.6	125.2	49	193.5	156.7	99	232.4	188.2
50	38.9	31.5	100	77.7	62.9	150	116.6	94.4	200	155.4	125.9	250	194.3	157.3	300	233.1	188.8
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 51 Deg.

270
313
5.13
12-
17-13
30
16.43
69.56
53.13
500.9
766.9

40 Difference of Latitude and Departure for 40 Deg.

Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep
1	00.8	00.6	51	39.1	32.8	101	77.4	64.9	151	115.7	97.1	201	154.0	129.2	251	192.3	161.4
2	01.5	01.3	52	39.8	33.4	02	78.1	65.6	52	116.4	97.7	02	154.7	129.9	52	193.0	162.0
3	02.3	01.9	53	40.6	34.1	03	78.9	66.2	53	117.2	98.4	03	155.5	130.5	53	193.8	162.6
4	03.1	02.6	54	41.4	34.7	04	79.7	66.8	54	118.0	99.0	04	156.3	131.1	54	194.6	163.3
5	03.8	03.2	55	42.1	35.3	05	80.4	67.5	55	118.7	99.6	05	157.0	131.8	55	195.3	163.9
6	04.6	03.9	56	42.9	36.0	106	81.2	68.1	156	119.5	100.3	206	157.8	132.4	256	196.1	164.6
7	05.4	04.5	57	43.7	36.6	07	82.0	68.8	57	120.3	100.9	07	158.6	133.1	57	196.9	165.2
8	06.1	05.1	58	44.4	37.3	08	82.7	69.4	58	121.0	101.6	08	159.3	133.7	58	197.6	165.9
9	06.9	05.8	59	45.2	37.9	09	83.5	70.1	59	121.8	102.2	09	160.1	134.4	59	198.4	166.5
10	07.7	06.4	60	46.0	38.6	10	84.3	70.7	60	122.6	102.8	10	160.9	135.0	60	199.2	167.1
11	08.4	07.1	61	46.7	39.2	111	85.0	71.3	161	123.3	103.5	211	161.6	135.6	261	199.9	167.8
12	09.2	07.7	62	47.5	39.9	12	85.8	72.0	62	124.1	104.1	12	162.4	136.3	62	200.7	168.4
13	10.0	08.4	63	48.3	40.5	13	86.6	72.6	63	124.9	104.8	13	163.2	136.9	63	201.4	169.1
14	10.7	09.0	64	49.0	41.1	14	87.3	73.3	64	125.6	105.4	14	163.9	137.6	64	202.2	169.7
15	11.5	09.6	65	49.8	41.8	15	88.1	73.9	65	126.4	106.1	15	164.7	138.2	65	203.0	170.4
16	12.3	10.3	66	50.6	42.4	116	88.9	74.6	166	127.2	106.7	216	165.4	138.8	266	203.7	171.0
17	13.0	10.9	67	51.3	43.1	17	89.6	75.2	67	127.9	107.3	17	166.2	139.5	67	204.5	171.6
18	13.8	11.6	68	52.1	43.7	18	90.4	75.9	68	128.7	108.0	18	167.0	140.1	68	205.3	172.3
19	14.6	12.2	69	52.9	44.4	19	91.2	76.5	69	129.4	108.6	19	167.7	140.8	69	206.0	172.9
20	15.3	12.9	70	53.6	45.0	20	91.9	77.1	70	130.2	109.3	20	168.5	141.4	70	206.8	173.6
21	16.1	13.5	71	54.4	45.6	121	92.7	77.8	171	131.0	109.9	221	169.3	142.1	271	207.6	174.2
22	16.9	14.1	72	55.2	46.3	22	93.4	78.4	72	131.7	110.6	22	170.0	142.7	72	208.3	174.8
23	17.6	14.8	73	55.9	46.9	23	94.2	79.1	73	132.5	111.2	23	170.8	143.3	73	209.1	175.5
24	18.4	15.4	74	56.7	47.6	24	95.0	79.7	74	133.3	111.9	24	171.6	144.0	74	209.9	176.1
25	19.2	16.1	75	57.4	48.2	25	95.7	80.4	75	134.0	112.5	25	172.3	144.6	75	210.6	176.8
26	19.9	16.7	76	58.2	48.9	126	96.5	81.0	176	134.8	113.1	226	173.1	145.3	276	211.4	177.4
27	20.7	17.4	77	59.0	49.5	27	97.3	81.6	77	135.6	113.8	27	173.9	145.9	77	212.2	178.1
28	21.4	18.0	78	59.7	50.1	28	98.0	82.3	78	136.3	114.4	28	174.6	146.6	78	212.9	178.7
29	22.2	18.6	79	60.5	50.8	29	98.8	82.9	79	137.1	115.1	29	175.4	147.2	79	213.7	179.3
30	23.0	19.3	80	61.3	51.4	30	99.6	83.6	80	137.9	115.7	30	176.2	147.9	80	214.5	180.0
31	23.7	19.9	81	62.0	52.1	131	100.3	84.2	181	138.6	116.4	231	176.9	148.5	281	215.2	180.6
32	24.5	20.6	82	62.8	52.7	32	101.1	84.9	82	139.4	117.0	32	177.7	149.1	82	216.0	181.3
33	25.3	21.2	83	63.6	53.4	33	101.9	85.5	83	140.2	117.6	33	178.5	149.8	83	216.8	181.9
34	26.0	21.9	84	64.3	54.0	34	102.6	86.1	84	140.9	118.3	34	179.2	150.4	84	217.5	182.6
35	26.8	22.5	85	65.1	54.6	35	103.4	86.8	85	141.7	118.9	35	180.0	151.1	85	218.3	183.2
36	27.6	23.1	86	65.9	55.3	136	104.2	87.4	186	142.5	119.6	236	180.8	151.7	286	219.1	183.9
37	28.3	23.8	87	66.6	55.9	37	104.9	88.1	87	143.2	120.2	37	181.5	152.4	87	219.8	184.5
38	29.1	24.4	88	67.4	56.6	38	105.7	88.7	88	144.0	120.9	38	182.3	153.0	88	220.6	185.1
39	29.9	25.1	89	68.2	57.2	39	106.5	89.4	89	144.8	121.5	39	183.1	153.6	89	221.4	185.8
40	30.6	25.7	90	68.9	57.9	40	107.2	90.0	90	145.5	122.1	40	183.8	154.3	90	222.1	186.4
41	31.4	26.4	91	69.7	58.5	141	108.0	90.6	191	146.3	122.8	241	184.6	154.9	291	222.9	187.1
42	32.2	27.0	92	70.5	59.1	42	108.8	91.3	92	147.1	123.4	42	185.4	155.6	92	223.7	187.7
43	32.9	27.6	93	71.2	59.8	43	109.5	91.9	93	147.8	124.1	43	186.1	156.2	93	224.4	188.4
44	33.7	28.3	94	72.0	60.4	44	110.3	92.6	94	148.6	124.7	44	186.9	156.9	94	225.2	189.0
45	34.5	28.9	95	72.8	61.1	45	111.1	93.2	95	149.4	125.4	45	187.7	157.5	95	226.0	189.6
46	35.2	29.6	96	73.5	61.7	146	111.8	93.9	196	150.1	126.0	246	188.4	158.1	296	226.7	190.3
47	36.0	30.2	97	74.3	62.4	47	112.6	94.5	97	150.9	126.6	47	189.2	158.8	97	227.5	190.9
48	36.8	30.8	98	75.1	63.0	48	113.4	95.1	98	151.7	127.3	48	190.0	159.4	98	228.3	191.6
49	37.5	31.5	99	75.8	63.6	49	114.1	95.8	99	152.4	127.9	49	190.7	160.1	99	229.0	192.2
50	38.3	32.1	100	76.6	64.3	150	114.9	96.4	200	153.2	128.6	250	191.5	160.7	300	229.8	192.9
Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat

for 50 Deg.

Difference of Latitude and Departure for 41 Deg. 41

Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep
1	00.8	00.7	51	38.5	33.5	101	76.2	66.3	151	114.0	99.0	201	151.7	131.8	251	189.4	164.6
2	01.5	01.3	52	39.2	34.1	02	77.0	66.9	52	114.7	99.7	02	152.5	132.5	52	190.2	165.3
3	02.3	02.0	53	40.0	34.8	03	77.7	67.6	53	115.5	100.4	03	153.2	133.2	53	190.9	166.0
4	03.0	02.6	54	40.8	35.4	04	78.5	68.2	54	116.2	101.0	04	154.0	133.8	54	191.7	166.6
5	03.8	03.3	55	41.5	36.1	05	79.1	8.9	55	117.0	101.7	05	154.7	134.5	55	192.5	167.3
6	04.5	03.9	56	42.3	36.7	106	80.0	69.5	156	117.7	102.3	206	155.3	135.1	256	193.2	167.9
7	05.3	04.6	57	43.0	37.4	07	80.8	70.2	57	118.5	103.0	07	156.2	135.8	57	194.0	168.6
8	06.0	05.2	58	43.8	38.0	08	81.5	70.8	58	119.2	103.6	08	157.0	136.4	58	194.7	169.2
9	06.8	05.9	59	44.5	38.7	09	82.3	71.5	59	120.0	104.3	09	157.7	137.1	59	195.5	169.9
10	07.5	06.6	60	45.3	39.4	10	83.0	72.2	60	120.8	105.0	10	158.5	137.7	60	196.2	170.5
11	08.3	07.2	61	46.0	40.0	111	83.8	72.8	161	121.5	105.6	211	159.2	138.4	261	197.0	171.2
12	09.1	07.9	62	46.8	40.7	12	84.5	73.5	62	122.3	106.3	12	160.0	139.1	62	197.7	171.9
13	09.8	08.5	63	47.5	41.3	13	85.3	74.1	63	123.0	106.9	13	160.8	139.7	63	198.5	172.5
14	10.6	09.2	64	48.3	42.0	14	86.0	74.8	64	123.8	107.6	14	161.5	140.4	64	199.2	173.2
15	11.3	09.8	65	49.1	42.6	15	86.8	75.4	65	124.5	108.2	15	162.3	141.0	65	200.0	173.8
16	12.1	10.5	66	49.8	43.3	116	87.5	76.1	166	125.3	108.9	216	163.0	141.7	266	200.8	174.5
17	12.8	11.2	67	50.6	44.0	17	88.3	76.7	67	126.0	109.5	17	163.8	142.3	67	201.5	175.1
18	13.6	11.8	68	51.3	44.6	18	89.1	77.4	68	126.8	110.2	18	164.5	143.0	68	202.3	175.8
19	14.3	12.5	69	52.1	45.3	19	89.8	78.1	69	127.5	110.9	19	165.3	143.6	69	203.0	176.4
20	15.1	13.1	70	52.8	45.9	20	90.6	78.7	70	128.3	111.5	20	166.0	144.3	70	203.8	177.1
21	15.8	13.8	71	53.6	46.6	121	91.3	79.4	171	129.1	112.2	221	166.8	145.0	271	204.5	177.8
22	16.6	14.4	72	54.3	47.2	22	92.1	80.0	72	129.8	112.8	22	167.5	145.6	72	205.3	178.4
23	17.4	15.1	73	55.1	47.9	23	92.8	80.7	73	130.6	113.5	23	168.3	146.3	73	206.0	179.1
24	18.1	15.7	74	55.8	48.5	24	93.6	81.3	74	131.3	114.1	24	169.1	146.9	74	206.8	179.7
25	18.9	16.4	75	56.6	49.2	25	94.3	82.0	75	132.1	114.8	25	169.8	147.6	75	207.5	180.4
26	19.6	17.1	76	57.4	49.9	126	95.1	82.6	176	132.8	115.4	226	170.6	148.2	276	208.3	181.0
27	20.4	17.7	77	58.1	50.5	27	95.8	83.3	77	133.6	116.1	27	171.3	148.9	77	209.1	181.7
28	21.1	18.4	78	58.9	51.2	28	96.6	84.0	78	134.3	116.8	28	172.1	149.6	78	209.8	182.4
29	21.9	19.0	79	59.6	51.8	29	97.4	84.6	79	135.1	117.4	29	172.8	150.2	79	210.6	183.0
30	22.6	19.7	80	60.4	52.5	30	98.1	85.3	80	135.8	118.1	30	173.6	150.9	80	211.3	183.7
31	23.4	20.3	81	61.1	53.1	131	98.9	85.9	181	136.6	118.7	231	174.3	151.5	281	212.1	184.3
32	24.2	21.0	82	61.9	53.8	32	99.6	86.6	82	137.4	119.4	32	175.1	152.2	82	212.8	185.0
33	24.9	21.6	83	62.6	54.4	33	100.4	87.2	83	138.1	120.0	33	175.8	152.8	83	213.6	185.6
34	25.7	22.3	84	63.4	55.1	34	101.1	87.9	84	138.9	120.7	34	176.6	153.5	84	214.3	186.3
35	26.4	23.0	85	64.2	55.8	35	101.9	88.6	85	139.6	121.4	35	177.4	154.1	85	215.1	186.9
36	27.2	23.6	86	64.9	56.4	136	102.6	89.2	186	140.4	122.0	236	178.1	154.8	286	215.8	187.6
37	27.9	24.3	87	65.7	57.1	37	103.4	89.9	87	141.1	122.7	37	178.9	155.5	87	216.6	188.3
38	28.7	24.9	88	66.4	57.7	38	104.2	90.5	88	141.9	123.3	38	179.6	156.1	88	217.4	188.9
39	29.4	25.6	89	67.2	58.4	39	104.9	91.2	89	142.6	124.0	39	180.4	156.8	89	218.1	189.6
40	30.2	26.2	90	67.9	59.0	40	105.7	91.8	90	143.4	124.6	40	181.1	157.4	90	218.9	190.2
41	30.9	26.9	91	68.7	59.7	141	106.4	92.5	191	144.2	125.3	241	181.9	158.1	291	219.6	190.9
42	31.7	27.6	92	69.4	60.4	42	107.2	93.1	92	144.9	125.9	42	182.6	158.7	92	220.4	191.5
43	32.5	28.2	93	70.2	61.0	43	107.9	93.8	93	145.7	126.6	43	183.4	159.4	93	221.1	192.2
44	33.2	28.9	94	70.9	61.7	44	108.7	94.5	94	146.4	127.3	44	184.2	160.0	94	221.9	192.8
45	34.0	29.5	95	71.7	62.3	45	109.4	95.1	95	147.2	127.9	45	184.9	160.7	95	222.6	193.5
46	34.7	30.2	96	72.5	63.0	146	110.2	95.8	196	147.9	128.6	246	185.7	161.4	296	223.4	194.2
47	35.5	30.8	97	73.2	63.6	47	110.9	96.4	97	148.7	129.2	47	186.4	162.0	97	224.2	194.8
48	36.2	31.5	98	74.0	64.3	48	111.7	97.1	98	149.4	129.9	48	187.2	162.7	98	224.9	195.5
49	37.0	32.1	99	74.7	64.9	49	112.5	97.7	99	150.2	130.5	49	187.9	163.3	99	225.7	196.1
50	37.7	32.8	100	75.5	65.6	150	113.2	98.4	200	150.9	131.2	250	188.7	164.0	300	226.4	196.8
Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat

for 49 Deg.

40 Difference of Latitude and Departure for 40 Deg.

Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep
1	00.8	00.6	51	39.1	32.8	101	77.4	64.9	151	115.7	97.1	201	154.0	129.2	251	192.3	161.4
2	01.5	01.3	52	39.8	33.4	02	78.1	65.6	52	116.4	97.7	02	154.7	129.9	52	193.0	162.0
3	02.3	01.9	53	40.6	34.1	03	78.9	66.2	53	117.2	98.4	03	155.5	130.5	53	193.8	162.6
4	03.1	02.6	54	41.4	34.7	04	79.7	66.8	54	118.0	99.0	04	156.3	131.1	54	194.6	163.3
5	03.8	03.2	55	42.1	35.3	05	80.4	67.5	55	118.7	99.6	05	157.0	131.8	55	195.3	163.9
6	04.6	03.9	56	42.9	36.0	106	81.2	68.1	156	119.5	100.3	206	157.8	132.4	256	196.1	164.6
7	05.4	04.5	57	43.7	36.6	07	82.0	68.8	57	120.3	100.9	07	158.6	133.1	57	196.9	165.2
8	06.1	05.1	58	44.4	37.3	08	82.7	69.4	58	121.0	101.6	08	159.3	133.7	58	197.6	165.9
9	06.9	05.8	59	45.2	37.9	09	83.5	70.1	59	121.8	102.2	09	160.1	134.4	59	198.4	166.5
10	07.7	06.4	60	46.0	38.6	10	84.3	70.7	60	122.6	102.8	10	160.9	135.0	60	199.2	167.1
11	08.4	07.1	61	46.7	39.2	111	85.0	71.3	161	123.3	103.5	211	161.6	135.6	261	199.9	167.8
12	09.2	07.7	62	47.5	39.9	12	85.8	72.0	62	124.1	104.1	12	162.4	136.3	62	200.7	168.4
13	10.0	08.4	63	48.3	40.5	13	86.6	72.6	63	124.9	104.8	13	163.2	136.9	63	201.4	169.1
14	10.7	09.0	64	49.0	41.1	14	87.3	73.3	64	125.6	105.4	14	163.9	137.6	64	202.2	169.7
15	11.5	09.6	65	49.8	41.8	15	88.1	73.9	65	126.4	106.1	15	164.7	138.2	65	203.0	170.4
16	12.3	10.3	66	50.6	42.4	116	88.9	74.6	166	127.2	106.7	216	165.4	138.8	266	203.7	171.0
17	13.0	10.9	67	51.3	43.1	17	89.6	75.2	67	127.9	107.3	17	166.2	139.5	67	204.5	171.6
18	13.8	11.6	68	52.1	43.7	18	90.4	75.9	68	128.7	108.0	18	167.0	140.1	68	205.3	172.3
19	14.6	12.2	69	52.9	44.4	19	91.2	76.5	69	129.4	108.6	19	167.7	140.8	69	206.0	172.9
20	15.3	12.9	70	53.6	45.0	20	91.9	77.1	70	130.2	109.3	20	168.5	141.4	70	206.8	173.6
21	16.1	13.5	71	54.4	45.6	121	92.7	77.8	171	131.0	109.9	221	169.3	142.1	271	207.6	174.2
22	16.9	14.1	72	55.2	46.3	22	93.4	78.4	72	131.7	110.6	22	170.0	142.7	72	208.3	174.8
23	17.6	14.8	73	55.9	46.9	23	94.2	79.1	73	132.5	111.2	23	170.8	143.3	73	209.1	175.5
24	18.4	15.4	74	56.7	47.6	24	95.0	79.7	74	133.3	111.9	24	171.6	144.0	74	209.9	176.1
25	19.2	16.1	75	57.4	48.2	25	95.7	80.4	75	134.0	112.5	25	172.3	144.6	75	210.6	176.8
26	19.9	16.7	76	58.2	48.9	126	96.5	81.0	176	134.8	113.1	226	173.1	145.3	276	211.4	177.4
27	20.7	17.4	77	59.0	49.5	27	97.3	81.6	77	135.6	113.8	27	173.9	145.9	77	212.2	178.1
28	21.4	18.0	78	59.7	50.1	28	98.0	82.3	78	136.3	114.4	28	174.6	146.6	78	212.9	178.7
29	22.2	18.6	79	60.5	50.8	29	98.8	82.9	79	137.1	115.1	29	175.4	147.2	79	213.7	179.3
30	23.0	19.3	80	61.3	51.4	30	99.6	83.6	80	137.9	115.7	30	176.2	147.9	80	214.5	180.0
31	23.7	19.9	81	62.0	52.1	131	100.3	84.2	181	138.6	116.4	231	176.9	148.5	281	215.2	180.6
32	24.5	20.6	82	62.8	52.7	32	101.1	84.9	82	139.4	117.0	32	177.7	149.1	82	216.0	181.3
33	25.3	21.2	83	63.6	53.4	33	101.9	85.5	83	140.2	117.6	33	178.5	149.8	83	216.8	181.9
34	26.0	21.9	84	64.3	54.0	34	102.6	86.1	84	140.9	118.3	34	179.2	150.4	84	217.5	182.6
35	26.8	22.5	85	65.1	54.6	35	103.4	86.8	85	141.7	118.9	35	180.0	151.1	85	218.3	183.2
36	27.6	23.1	86	65.9	55.3	136	104.2	87.4	186	142.5	119.6	236	180.8	151.7	286	219.1	183.9
37	28.3	23.8	87	66.6	55.9	37	104.9	88.1	87	143.2	120.2	37	181.5	152.4	87	219.8	184.5
38	29.1	24.4	88	67.4	56.6	38	105.7	88.7	88	144.0	120.9	38	182.3	153.0	88	220.6	185.1
39	29.9	25.1	89	68.2	57.2	39	106.5	89.4	89	144.8	121.5	39	183.1	153.6	89	221.4	185.8
40	30.6	25.7	90	68.9	57.9	40	107.2	90.0	90	145.5	122.1	40	183.8	154.3	90	222.1	186.4
41	31.4	26.4	91	69.7	58.5	141	108.0	90.6	191	146.3	122.8	241	184.6	154.9	291	222.9	187.1
42	32.2	27.0	92	70.5	59.1	42	108.8	91.3	92	147.1	123.4	42	185.4	155.6	92	223.7	187.7
43	32.9	27.6	93	71.2	59.8	43	109.5	91.9	93	147.8	124.1	43	186.1	156.2	93	224.4	188.4
44	33.7	28.3	94	72.0	60.4	44	110.3	92.6	94	148.6	124.7	44	186.9	156.9	94	225.2	189.0
45	34.5	28.9	95	72.8	61.1	45	111.1	93.2	95	149.4	125.4	45	187.7	157.5	95	226.0	189.6
46	35.2	29.6	96	73.5	61.7	146	111.8	93.9	196	150.1	126.0	246	188.4	158.1	296	226.7	190.3
47	36.0	30.2	97	74.3	62.4	47	112.6	94.5	97	150.9	126.6	47	189.2	158.8	97	227.5	190.9
48	36.8	30.8	98	75.1	63.0	48	113.4	95.1	98	151.7	127.3	48	190.0	159.4	98	228.3	191.6
49	37.5	31.5	99	75.8	63.6	49	114.1	95.8	99	152.4	127.9	49	190.7	160.1	99	229.0	192.2
50	38.3	32.1	100	76.6	64.3	150	114.9	96.4	200	153.2	128.6	250	191.5	160.7	300	229.8	192.9
Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat

for 50 Deg.

Difference of Latitude and Departure for 41 Deg. 41

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.8	00.7	51	38.5	33.5	101	76.2	66.3	151	114.0	99.0	201	151.7	131.8	251	189.4	164.6
2	01.5	01.3	52	39.2	34.1	02	77.0	6.9	52	114.7	99.7	02	152.5	132.5	52	190.2	165.3
3	02.3	02.0	53	40.0	34.8	03	77.7	67.6	53	115.5	100.4	03	153.2	133.2	53	190.9	166.0
4	03.0	02.6	54	40.8	35.4	04	78.5	68.2	54	116.2	101.0	04	154.0	133.8	54	191.7	166.6
5	03.8	03.3	55	41.5	36.1	05	79.1	8.9	55	117.0	101.7	05	154.7	134.5	55	192.5	167.3
6	04.5	03.9	56	42.3	36.7	106	80.0	69.5	156	117.7	102.3	206	155.5	135.1	256	193.2	167.9
7	05.3	04.6	57	43.0	37.4	07	80.8	70.2	57	118.5	103.0	07	156.2	135.8	57	194.0	168.6
8	06.0	05.2	58	43.8	38.0	08	81.5	70.8	58	119.2	103.6	08	157.0	136.4	58	194.7	169.2
9	06.8	05.9	59	44.5	38.7	09	82.3	71.5	59	120.0	104.3	09	157.7	137.1	59	195.5	169.9
10	07.5	06.6	60	45.3	39.4	10	83.0	72.2	60	120.8	105.0	10	158.5	137.7	60	196.2	170.5
11	08.3	07.2	61	46.0	40.0	111	83.8	72.8	161	121.5	105.6	211	159.2	138.4	261	197.0	171.2
12	09.1	07.9	62	46.8	40.7	12	84.5	73.5	62	122.3	106.3	12	160.0	139.1	62	197.7	171.9
13	09.8	08.5	63	47.5	41.3	13	85.3	74.1	63	123.0	106.9	13	160.8	139.7	63	198.5	172.5
14	10.6	09.2	64	48.3	42.0	14	86.0	74.8	64	123.8	107.6	14	161.5	140.4	64	199.2	173.2
15	11.3	09.8	65	49.1	42.6	15	86.8	75.4	65	124.5	108.2	15	162.3	141.0	65	200.0	173.8
16	12.1	10.5	66	49.8	43.3	116	87.5	76.1	166	125.3	108.9	216	163.0	141.7	266	200.8	174.5
17	12.8	11.2	67	50.6	44.0	17	88.3	76.7	67	126.0	109.5	17	163.8	142.3	67	201.5	175.1
18	13.6	11.8	68	51.3	44.6	18	89.1	77.4	68	126.8	110.2	18	164.5	143.0	68	202.3	175.8
19	14.3	12.5	69	52.1	45.3	19	89.8	78.1	69	127.5	110.9	19	165.3	143.6	69	203.0	176.4
20	15.1	13.1	70	52.8	45.9	20	90.6	78.7	70	128.3	111.5	20	166.0	144.3	70	203.8	177.1
21	15.8	13.8	71	53.6	46.6	121	91.3	79.4	171	129.1	112.2	221	166.8	145.0	271	204.5	177.8
22	16.6	14.4	72	54.3	47.2	22	92.1	80.0	72	129.8	112.8	22	167.5	145.6	72	205.3	178.4
23	17.4	15.1	73	55.1	47.9	23	92.8	80.7	73	130.6	113.5	23	168.3	146.3	73	206.0	179.1
24	18.1	15.7	74	55.8	48.5	24	93.6	81.3	74	131.3	114.1	24	169.1	146.9	74	206.8	179.7
25	18.9	16.4	75	56.6	49.2	25	94.3	82.0	75	132.1	114.8	25	169.8	147.6	75	207.5	180.4
26	19.6	17.1	76	57.4	49.9	126	95.1	82.6	176	132.8	115.4	226	170.6	148.2	276	208.3	181.0
27	20.4	17.7	77	58.1	50.5	27	95.8	83.3	77	133.6	116.1	27	171.3	148.9	77	209.1	181.7
28	21.1	18.4	78	58.9	51.2	28	96.6	84.0	78	134.3	116.8	28	172.1	149.6	78	209.8	182.4
29	21.9	19.0	79	59.6	51.8	29	97.4	84.6	79	135.1	117.4	29	172.8	150.2	79	210.6	183.0
30	22.6	19.7	80	60.4	52.5	30	98.1	85.3	80	135.8	118.1	30	173.6	150.9	80	211.3	183.7
31	23.4	20.3	81	61.1	53.1	131	98.9	85.9	181	136.6	118.7	231	174.3	151.5	281	212.1	184.3
32	24.2	21.0	82	61.9	53.8	32	99.6	86.6	82	137.4	119.4	32	175.1	152.2	82	212.8	185.0
33	24.9	21.6	83	62.6	54.4	33	100.4	87.2	83	138.1	120.0	33	175.8	152.8	83	213.6	185.6
34	25.7	22.3	84	63.4	55.1	34	101.1	87.9	84	138.9	120.7	34	176.6	153.5	84	214.3	186.3
35	26.4	23.0	85	64.2	55.8	35	101.9	88.6	85	139.6	121.4	35	177.4	154.1	85	215.1	186.9
36	27.2	23.6	86	64.9	56.4	136	102.6	89.2	186	140.4	122.0	236	178.1	154.8	286	215.8	187.6
37	27.9	24.3	87	65.7	57.1	37	103.4	89.9	87	141.1	122.7	37	178.9	155.5	87	216.6	188.3
38	28.7	24.9	88	66.4	57.7	38	104.2	90.5	88	141.9	123.3	38	179.6	156.1	88	217.4	188.9
39	29.4	25.6	89	67.2	58.4	39	104.9	91.2	89	142.6	124.0	39	180.4	156.8	89	218.1	189.6
40	30.2	26.2	90	67.9	59.0	40	105.7	91.8	90	143.4	124.6	40	181.1	157.4	90	218.9	190.2
41	30.9	26.9	91	68.7	59.7	141	106.4	92.5	191	144.2	125.3	241	181.9	158.1	291	219.6	190.9
42	31.7	27.6	92	69.4	60.4	42	107.2	93.1	92	144.9	125.9	42	182.6	158.7	92	220.4	191.5
43	32.5	28.2	93	70.2	61.0	43	107.9	93.8	93	145.7	126.6	43	183.4	159.4	93	221.1	192.2
44	33.2	28.9	94	70.9	61.7	44	108.7	94.5	94	146.4	127.3	44	184.2	160.0	94	221.9	192.8
45	34.0	29.5	95	71.7	62.3	45	109.4	95.1	95	147.2	127.9	45	184.9	160.7	95	222.6	193.5
46	34.7	30.2	96	72.5	63.0	146	110.2	95.8	196	147.9	128.6	246	185.7	161.4	296	223.4	194.2
47	35.5	30.8	97	73.2	63.6	47	110.9	96.4	97	148.7	129.2	47	186.4	162.0	97	224.2	194.8
48	36.2	31.5	98	74.0	64.3	48	111.7	97.1	98	149.4	129.9	48	187.2	162.7	98	224.9	195.5
49	37.0	32.1	99	74.7	64.9	49	112.5	97.7	99	150.2	130.5	49	187.9	163.3	99	225.7	196.1
50	37.7	32.8	100	75.5	65.6	150	113.2	98.4	200	150.9	131.2	250	188.7	164.0	300	226.4	196.8
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 49 Deg.

42 Difference of Latitude and Departure for 42 Deg.

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	00.7	00.7	51	37.9	34.1	101	75.0	67.6	151	112.2	101.0	201	149.3	134.5	251	186.5	167.9
2	01.5	01.3	52	38.6	34.8	01	75.8	68.2	52	112.9	101.7	02	150.1	135.1	52	187.2	168.6
3	02.2	02.0	53	39.4	35.5	0	76.5	68.9	53	113.7	102.4	03	150.8	135.8	53	187.9	169.3
4	03.0	02.7	54	40.1	36.1	04	77.3	69.6	54	114.4	103.0	04	151.5	136.5	54	188.7	169.9
5	03.7	03.3	55	40.9	36.8	05	78.0	70.2	55	115.1	103.7	05	152.3	137.1	55	189.4	170.6
6	04.5	04.0	56	41.6	37.5	106	78.7	70.9	156	115.9	104.4	206	153.0	137.8	256	190.2	171.3
7	05.2	04.7	57	42.3	38.1	07	79.5	71.6	57	116.8	105.0	07	153.8	138.5	57	190.9	171.9
8	05.9	05.4	58	43.1	38.8	08	80.2	72.3	58	117.4	105.7	08	154.5	139.1	58	191.7	172.6
9	06.7	06.0	59	43.8	39.5	09	81.0	72.9	59	118.1	106.4	09	155.3	139.8	59	192.4	173.3
10	07.4	06.7	60	44.6	40.1	10	81.7	73.6	60	108.9	107.0	10	156.0	140.5	60	193.1	173.9
11	08.2	07.4	61	45.3	40.8	111	82.5	74.3	161	119.6	107.7	211	156.7	141.2	261	193.9	174.6
12	08.9	08.0	62	46.1	41.5	12	83.2	74.9	62	120.3	108.4	12	157.5	141.8	62	194.6	175.3
13	09.7	08.7	63	46.8	42.1	13	83.9	75.6	63	121.0	109.0	13	158.2	142.5	63	195.4	175.9
14	10.4	09.4	64	47.5	42.8	14	84.7	76.3	64	121.8	109.7	14	159.0	143.2	64	196.1	176.6
15	11.1	10.0	65	48.3	43.5	15	85.4	76.9	65	122.6	110.4	15	159.7	143.8	65	196.8	177.3
16	11.9	10.7	66	49.0	44.2	116	86.2	77.6	166	123.3	111.0	216	160.5	144.5	266	197.6	177.9
17	12.6	11.4	67	49.8	44.8	17	86.9	78.3	67	124.1	111.7	17	161.2	145.2	67	198.3	178.6
18	13.4	12.0	68	50.5	45.5	18	87.7	78.9	68	124.8	112.4	18	161.9	145.8	68	199.1	179.3
19	14.1	12.7	69	51.3	46.2	19	88.4	79.6	69	125.5	113.1	19	162.7	146.5	69	199.8	180.0
20	14.9	13.4	70	52.0	46.8	20	89.1	80.3	70	126.3	113.7	20	163.4	147.2	70	200.6	180.6
21	15.6	14.0	71	52.7	47.5	121	89.9	80.9	171	127.0	114.4	221	164.2	147.8	271	201.3	181.3
22	16.3	14.7	72	53.5	48.2	22	90.6	81.6	72	127.8	115.1	22	164.9	148.5	72	202.1	182.0
23	17.1	15.4	73	54.2	48.8	23	91.4	82.3	73	128.5	115.7	23	165.7	149.2	73	202.8	182.6
24	17.8	16.1	74	55.0	49.5	24	92.1	83.0	74	129.3	116.4	24	166.4	149.9	74	203.5	183.3
25	18.6	16.7	75	55.7	50.2	25	92.9	83.6	75	130.0	117.1	25	167.1	150.5	75	204.3	184.0
26	19.3	17.4	76	56.5	50.8	126	93.6	84.3	176	130.7	117.7	226	167.9	151.2	276	205.0	184.6
27	20.1	18.1	77	57.2	51.5	27	94.3	85.0	77	131.5	118.4	27	168.6	151.9	77	205.8	185.3
28	20.8	18.7	78	57.9	52.2	28	95.1	85.6	78	132.2	119.1	28	169.4	152.5	78	206.5	186.0
29	21.5	19.4	79	58.7	52.9	29	95.8	86.3	79	133.0	119.7	29	170.1	153.2	79	207.3	186.6
30	22.3	20.1	80	59.4	53.5	30	96.6	87.0	80	133.7	120.4	30	170.9	153.9	80	208.0	187.3
31	23.0	20.7	81	60.2	54.2	131	97.3	87.6	181	134.5	121.1	231	171.6	154.5	281	208.7	188.0
32	23.8	21.4	82	60.9	54.9	32	98.1	88.3	82	135.2	121.8	32	172.3	155.2	82	209.5	188.7
33	24.5	22.1	83	61.7	55.5	33	98.8	89.0	83	135.9	122.4	33	173.1	155.9	83	210.2	189.3
34	25.3	22.7	84	62.4	56.2	34	99.5	89.6	84	136.7	123.1	34	173.8	156.5	84	211.0	190.0
35	26.0	23.4	85	63.1	56.9	35	100.3	90.3	85	137.4	123.8	35	174.6	157.2	85	211.7	190.7
36	26.7	24.1	86	63.9	57.5	136	101.0	91.0	186	138.2	124.4	236	175.3	157.9	286	212.5	191.3
37	27.5	24.8	87	64.6	58.2	37	101.8	91.7	87	138.9	125.1	37	176.1	158.5	87	213.2	192.0
38	28.2	25.4	88	65.4	58.9	38	102.5	92.3	88	139.7	125.8	38	176.8	159.2	88	213.9	192.7
39	29.0	26.1	89	66.1	59.5	39	103.3	93.0	89	140.4	126.4	39	177.5	159.9	89	214.7	193.3
40	29.7	26.8	90	66.9	60.2	40	104.0	93.7	90	141.1	127.1	40	178.3	160.6	90	215.4	194.0
41	30.5	27.4	91	67.6	60.9	141	104.7	94.3	191	141.9	127.8	241	179.0	161.2	291	216.2	194.7
42	31.2	28.1	92	68.3	61.5	42	105.5	95.0	92	142.6	128.4	42	179.8	161.9	92	216.9	195.3
43	31.9	28.8	93	69.1	62.2	43	106.2	95.7	93	143.4	129.1	43	180.5	162.6	93	217.7	196.0
44	32.7	29.4	94	69.8	62.9	44	107.0	96.3	94	144.1	129.8	44	181.3	163.2	94	218.4	196.7
45	33.4	30.1	95	70.6	63.6	45	107.7	97.0	95	144.9	130.5	45	182.0	163.9	95	219.1	197.4
46	34.2	30.8	96	71.3	64.2	146	108.5	97.7	196	145.6	131.1	246	182.7	164.6	296	219.9	198.0
47	34.9	31.4	97	72.1	64.9	47	109.2	98.3	97	146.3	131.8	47	183.5	165.2	97	220.6	198.7
48	35.7	32.1	98	72.8	65.6	48	109.9	99.0	98	147.1	132.5	48	184.2	165.9	98	221.4	199.4
49	36.4	32.8	99	73.5	66.2	49	110.7	99.7	99	147.8	133.1	49	185.0	166.6	99	222.1	200.0
50	37.1	33.5	100	74.3	66.9	150	111.4	100.4	200	148.6	133.8	250	185.7	167.2	300	222.9	200.7
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 48 Deg.

Difference of Latitude and Departure for 43 Deg.

43

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.7	00.7	51	37.3	34.8	101	73.9	68.9	151	110.4	103.0	201	147.0	137.1	251	183.6	171.2
2	01.5	01.4	52	38.0	35.5	02	74.6	69.5	52	111.2	103.6	02	147.7	137.7	52	184.3	171.8
3	02.2	02.0	53	38.8	36.2	03	75.3	70.2	53	111.9	104.3	03	148.5	138.4	53	185.0	172.5
4	02.9	02.7	54	39.5	36.8	04	76.1	70.9	54	112.6	105.0	04	149.2	139.1	54	185.8	173.2
5	03.7	03.4	55	40.2	37.5	05	76.8	71.6	55	113.4	105.7	05	149.9	139.8	55	186.5	173.9
6	04.4	04.1	56	41.0	38.2	106	77.5	72.3	156	114.1	106.4	206	150.7	140.4	256	187.2	174.5
7	05.1	04.8	57	41.7	38.9	07	78.3	73.0	57	114.8	107.1	07	151.4	141.2	57	188.0	175.2
8	05.9	05.5	58	42.4	39.5	08	79.0	73.6	58	115.6	107.7	08	152.1	141.8	58	188.7	175.9
9	06.6	06.2	59	43.1	40.2	09	79.7	74.3	59	116.3	108.4	09	152.9	142.5	59	189.4	176.6
10	07.3	06.8	60	43.9	40.9	10	80.4	75.0	60	117.0	109.1	10	153.6	143.2	60	190.1	177.3
11	08.0	07.5	61	44.6	41.6	111	81.2	75.7	161	117.7	109.8	211	154.3	143.9	261	190.9	178.0
12	08.8	08.2	62	45.3	42.3	12	81.9	76.4	62	118.5	110.5	12	155.0	144.5	62	191.6	178.6
13	09.5	08.9	63	46.1	43.0	13	82.6	77.1	63	119.2	111.2	13	155.8	145.2	63	192.3	179.3
14	10.2	09.5	64	46.8	43.6	14	83.4	77.7	64	119.9	111.8	14	156.5	145.9	64	193.1	180.0
15	11.0	10.2	65	47.5	44.3	15	84.1	78.4	65	120.7	112.5	15	157.2	146.6	65	193.8	180.7
16	11.7	10.9	66	48.3	45.0	116	84.8	79.1	166	121.4	113.2	216	158.0	147.3	266	194.5	181.4
17	12.4	11.6	67	49.0	45.7	17	85.6	79.8	67	122.1	113.9	17	158.7	148.0	67	195.3	182.1
18	13.2	12.3	68	49.7	46.4	18	86.3	80.5	68	122.9	114.5	18	159.4	148.6	68	196.0	182.7
19	13.9	13.0	69	50.5	47.1	19	87.0	81.2	69	123.6	115.2	19	160.2	149.3	69	196.7	183.4
20	14.6	13.6	70	51.2	47.7	20	87.8	81.8	70	124.3	115.9	20	160.9	150.0	70	197.5	184.1
21	15.4	14.3	71	51.9	48.4	121	88.5	82.5	171	125.1	116.6	221	161.6	150.7	271	198.2	184.8
22	16.1	15.0	72	52.7	49.1	22	89.2	83.2	72	125.8	117.3	22	162.4	151.4	72	198.9	185.5
23	16.8	15.7	73	53.4	49.8	23	90.0	83.9	73	126.5	118.0	23	163.1	152.1	73	199.7	186.2
24	17.6	16.4	74	54.1	50.5	24	90.7	84.5	74	127.3	118.6	24	163.8	152.7	74	200.4	186.8
25	18.3	17.1	75	54.9	51.2	25	91.4	85.2	75	128.0	119.3	25	164.6	153.4	75	201.1	187.5
26	19.0	17.7	76	55.6	51.8	126	92.1	85.9	176	128.7	120.0	226	165.3	154.1	276	201.9	188.2
27	19.7	18.4	77	56.3	52.5	27	92.9	86.6	77	129.4	120.7	27	166.0	154.8	77	202.6	188.9
28	20.5	19.1	78	57.0	53.2	28	93.6	87.3	78	130.2	121.4	28	166.7	155.5	78	203.3	189.5
29	21.2	19.8	79	57.8	53.9	29	94.3	88.0	79	130.9	122.1	29	167.5	156.2	79	204.0	190.2
30	21.9	20.5	80	58.5	54.5	30	95.1	88.6	80	131.6	122.7	30	168.2	156.8	80	204.8	190.9
31	22.7	21.2	81	59.2	55.2	131	95.8	89.3	181	132.4	123.4	231	168.9	157.5	281	205.5	191.6
32	23.4	21.8	82	60.0	55.9	32	96.5	90.0	82	133.1	124.1	32	169.7	158.2	82	206.2	192.3
33	24.1	22.5	83	60.7	56.6	33	97.3	90.7	83	133.8	124.8	33	170.4	158.9	83	207.0	193.0
34	24.9	23.2	84	61.4	57.3	34	98.0	91.4	84	134.6	125.5	34	171.1	159.5	84	207.7	193.6
35	25.6	23.9	85	62.2	58.0	35	98.7	92.1	85	135.3	126.2	35	171.9	160.2	85	208.4	194.3
36	26.3	24.5	86	62.9	58.6	136	99.5	92.7	186	136.0	126.8	236	172.6	160.9	286	209.2	195.0
37	27.1	25.2	87	63.6	59.3	37	100.2	93.4	87	136.8	127.5	37	173.3	161.6	87	209.9	195.7
38	27.8	25.9	88	64.4	60.0	38	100.9	94.1	88	137.5	128.2	38	174.1	162.3	88	210.6	196.4
39	28.5	26.6	89	65.1	60.7	39	101.7	94.8	89	138.2	128.9	39	174.8	163.0	89	211.4	197.1
40	29.3	27.3	90	65.8	61.4	40	102.4	95.5	90	139.0	129.5	40	175.5	163.6	90	212.1	197.7
41	30.0	28.0	91	66.6	62.1	141	103.1	96.2	191	139.7	130.2	41	176.3	164.3	291	212.8	198.4
42	30.7	28.6	92	67.3	62.7	42	103.8	96.8	92	140.4	130.9	42	177.0	165.0	92	213.6	199.1
43	31.4	29.3	93	68.0	63.4	43	104.6	97.5	93	141.1	131.6	43	177.7	165.7	93	214.3	199.8
44	32.2	30.0	94	68.7	64.1	44	105.3	98.2	94	141.9	132.3	44	178.4	166.4	94	215.0	200.5
45	32.9	30.7	95	69.5	64.8	45	106.0	98.9	95	142.6	133.0	45	179.2	167.1	95	215.7	201.2
46	33.6	31.4	96	70.2	65.5	146	106.8	99.5	196	143.3	133.6	246	179.9	167.7	296	216.5	201.8
47	34.4	32.1	97	70.9	66.2	47	107.5	100.2	97	144.1	134.3	47	180.6	168.4	97	217.2	202.5
48	35.1	32.7	98	71.7	66.8	48	108.2	100.9	98	144.8	135.0	48	181.4	169.1	98	217.9	203.2
49	35.8	33.4	99	72.4	67.5	49	109.0	101.6	99	145.5	135.7	49	182.1	169.8	99	218.7	203.9
50	36.6	34.1	100	73.1	68.2	150	109.7	102.3	200	146.3	136.4	250	182.8	170.5	300	219.4	204.6
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 47 Deg.

33.53
44.15

D.	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	00.7	00.7	51	36.7	35.4	101	72.6	70.2	151	108.6	104.9	201	144.6	139.6	251	180.5	174.3
2	01.4	01.4	52	37.4	36.1	02	73.4	70.8	52	109.3	105.6	02	145.3	140.3	52	181.3	175.0
3	02.2	02.1	53	38.1	36.8	03	74.1	71.5	53	110.1	106.3	03	146.0	141.0	53	182.0	175.7
4	02.9	02.8	54	38.8	37.5	04	74.8	72.2	54	110.8	107.0	04	146.7	141.7	54	182.7	176.4
5	03.6	03.5	55	39.6	38.2	05	75.5	72.9	55	111.5	107.7	05	147.5	142.4	55	183.4	177.1
6	04.3	04.2	56	40.3	38.9	06	76.2	73.6	56	112.2	108.4	06	148.2	143.1	56	184.1	177.8
7	05.0	04.9	57	41.0	39.6	07	77.0	74.3	57	112.9	109.1	07	148.9	143.8	57	184.9	178.5
8	05.8	05.6	58	41.7	40.3	08	77.7	75.0	58	113.6	109.7	08	149.6	144.5	58	185.6	179.2
9	06.5	06.3	59	42.4	41.0	09	78.4	75.7	59	114.4	110.4	09	150.3	145.2	59	186.3	179.9
10	07.2	06.9	60	43.2	41.7	10	79.1	76.4	60	115.1	111.1	10	151.1	145.9	60	187.0	180.6
11	07.9	07.6	61	43.9	42.4	11	79.8	77.1	161	115.8	111.8	211	151.8	146.6	261	187.7	181.3
12	08.6	08.3	62	44.6	43.1	12	80.6	77.8	62	116.5	112.5	12	152.5	147.3	62	188.5	182.0
13	09.4	09.0	63	45.3	43.8	13	81.3	78.5	63	117.2	113.2	13	153.2	147.9	63	189.2	182.7
14	10.1	09.7	64	46.0	44.5	14	82.0	79.2	64	118.0	113.9	14	153.9	148.6	64	189.9	183.4
15	10.8	10.4	65	46.8	45.1	15	82.7	79.9	65	118.7	114.6	15	154.6	149.3	65	190.6	184.1
16	11.5	11.1	66	47.5	45.8	16	83.4	80.6	166	119.4	115.3	216	155.4	150.0	266	191.3	184.8
17	12.2	11.8	67	48.2	46.5	17	84.2	81.3	67	120.1	116.0	17	156.1	150.7	67	192.1	185.5
18	12.9	12.5	68	48.9	47.2	18	84.9	82.0	68	120.8	116.7	18	156.8	151.4	68	192.8	186.1
19	13.7	13.2	69	49.6	47.9	19	85.6	82.7	69	121.6	117.4	19	157.5	152.1	69	193.5	186.8
20	14.4	13.9	70	50.4	48.6	20	86.3	83.4	70	122.3	118.1	20	158.2	152.8	70	194.2	187.5
21	15.1	14.6	71	51.1	49.3	21	87.0	84.0	171	123.0	118.8	221	159.0	153.5	271	194.9	188.2
22	15.8	15.3	72	51.8	50.0	22	87.8	84.7	72	123.7	119.5	22	159.7	154.2	72	195.6	188.9
23	16.5	16.0	73	52.5	50.7	23	88.5	85.4	73	124.4	120.2	23	160.4	154.9	73	196.4	189.6
24	17.3	16.7	74	53.2	51.4	24	89.2	86.1	74	125.2	120.9	24	161.1	155.6	74	197.1	190.3
25	18.0	17.4	75	53.9	52.1	25	89.9	86.8	75	125.9	121.6	25	161.8	156.3	75	197.8	191.0
26	18.7	18.1	76	54.7	52.8	26	90.6	87.5	176	126.6	122.2	226	162.6	157.0	276	198.5	191.7
27	19.4	18.8	77	55.4	53.5	27	91.4	88.2	77	127.3	122.9	27	163.3	157.7	77	199.2	192.4
28	20.1	19.4	78	56.1	54.2	28	92.1	88.9	78	128.0	123.6	28	164.0	158.4	78	200.0	193.1
29	20.9	20.1	79	56.8	54.9	29	92.8	89.6	79	128.8	124.3	29	164.7	159.1	79	200.7	193.8
30	21.6	20.8	80	57.5	55.6	30	93.5	90.3	80	129.5	125.0	30	165.4	159.8	80	201.4	194.5
31	22.3	21.5	81	58.3	56.3	31	94.2	91.0	181	130.2	125.7	231	166.2	160.4	281	202.1	195.2
32	23.0	22.2	82	59.0	57.0	32	94.9	91.7	82	130.9	126.4	32	166.9	161.1	82	202.8	195.9
33	23.7	22.9	83	59.7	57.7	33	95.7	92.4	83	131.6	127.1	33	167.6	161.8	83	203.6	196.6
34	24.5	23.6	84	60.4	58.3	34	96.4	93.1	84	132.4	127.8	34	168.3	162.5	84	204.3	197.3
35	25.2	24.3	85	61.1	59.0	35	97.1	93.8	85	133.1	128.5	35	169.0	163.2	85	205.0	198.0
36	25.9	25.0	86	61.9	59.7	36	97.8	94.5	186	133.8	129.2	236	169.8	163.9	286	205.7	198.7
37	26.6	25.7	87	62.6	60.4	37	98.5	95.2	87	134.5	129.9	37	170.5	164.6	87	206.4	199.3
38	27.3	26.4	88	63.3	61.1	38	99.3	95.9	88	135.2	130.6	38	171.2	165.3	88	207.2	200.0
39	28.1	27.1	89	64.0	61.8	39	100.0	96.5	89	135.9	131.3	39	171.9	166.0	89	207.9	200.7
40	28.8	27.8	90	64.7	62.5	40	100.7	97.2	90	136.7	132.0	40	172.6	166.7	90	208.6	201.4
41	29.5	28.5	91	65.5	63.2	41	101.4	97.9	191	137.4	132.7	241	173.4	167.4	291	209.3	202.1
42	30.2	29.2	92	66.2	63.9	42	102.1	98.6	92	138.1	133.4	42	174.1	168.1	92	210.0	202.8
43	30.9	29.9	93	66.9	64.6	43	102.9	99.3	93	138.8	134.1	43	174.8	168.8	93	210.8	203.5
44	31.6	30.6	94	67.6	65.3	44	103.6	100.0	94	139.5	134.8	44	175.5	169.5	94	211.5	204.2
45	32.4	31.3	95	68.3	66.0	45	104.3	100.7	95	140.3	135.4	45	176.2	170.2	95	212.2	204.9
46	33.1	32.0	96	69.1	66.7	46	105.0	101.4	196	141.0	136.1	246	176.9	170.9	296	212.9	205.6
47	33.8	32.6	97	69.8	67.4	47	105.7	102.1	97	141.7	136.8	47	177.7	171.6	97	213.6	206.3
48	34.5	33.3	98	70.5	68.1	48	106.5	102.8	98	142.4	137.5	48	178.4	172.3	98	214.4	207.0
49	35.2	34.0	99	71.2	68.8	49	107.2	103.5	99	143.1	138.2	49	179.1	173.0	99	215.1	207.7
50	36.0	34.7	100	71.9	69.5	150	107.9	104.2	200	143.9	138.9	50	179.8	173.6	300	215.8	208.4
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 46 Deg.

Difference of Latitude and Departure for 45 Deg.

45

Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep
1	00.7	00.7	51	36.1	36.1	101	71.4	71.4	151	106.8	106.8	201	142.1	142.1	251	177.5	177.5
2	01.4	01.4	52	36.8	36.8	02	72.1	72.1	52	107.5	107.5	02	142.8	142.8	52	178.2	178.2
3	02.1	02.1	53	37.5	37.5	03	72.8	72.8	53	108.2	108.2	03	143.5	143.5	53	178.9	178.9
4	02.8	02.8	54	38.2	38.2	04	73.5	73.5	54	108.9	108.9	04	144.2	144.2	54	179.6	179.6
5	03.5	03.5	55	38.9	38.9	05	74.2	74.2	55	109.6	109.6	05	144.9	144.9	55	180.3	180.3
6	04.2	04.2	56	39.6	39.6	106	74.9	74.9	156	110.3	110.3	206	145.7	145.7	256	181.0	181.0
7	04.9	04.9	57	40.3	40.3	07	75.7	75.7	57	111.0	111.0	07	146.4	146.4	57	181.7	181.7
8	05.7	05.7	58	41.0	41.0	08	76.4	76.4	58	111.7	111.7	08	147.1	147.1	58	182.4	182.4
9	06.4	06.4	59	41.7	41.7	09	77.1	77.1	59	112.4	112.4	09	147.8	147.8	59	183.1	183.1
10	07.1	07.1	60	42.4	42.4	10	77.8	77.8	60	113.1	113.1	10	148.5	148.5	60	183.8	183.8
11	07.8	07.8	61	43.1	43.1	111	78.5	78.5	161	113.8	113.8	211	149.2	149.2	261	184.5	184.5
12	08.5	08.5	62	43.8	43.8	12	79.2	79.2	62	114.5	114.5	12	149.9	149.9	62	185.3	185.3
13	09.2	09.2	63	44.5	44.5	13	79.9	79.9	63	115.3	115.3	13	150.6	150.6	63	186.0	186.0
14	09.9	09.9	64	45.3	45.3	14	80.6	80.6	64	116.0	116.0	14	151.3	151.3	64	186.7	186.7
15	10.6	10.6	65	46.0	46.0	15	81.3	81.3	65	116.7	116.7	15	152.0	152.0	65	187.4	187.4
16	11.3	11.3	66	46.7	46.7	116	82.0	82.0	166	117.4	117.4	216	152.7	152.7	266	188.1	188.1
17	12.0	12.0	67	47.4	47.4	17	82.7	82.7	67	118.1	118.1	17	153.4	153.4	67	188.8	188.8
18	12.7	12.7	68	48.1	48.1	18	83.4	83.4	68	118.8	118.8	18	154.1	154.1	68	189.5	189.5
19	13.4	13.4	69	48.8	48.8	19	84.1	84.1	69	119.5	119.5	19	154.8	154.8	69	190.2	190.2
20	14.1	14.1	70	49.5	49.5	20	84.8	84.8	70	120.2	120.2	20	155.6	155.6	70	190.9	190.9
21	14.8	14.8	71	50.2	50.2	121	85.6	85.6	171	120.9	120.9	221	156.3	156.3	271	191.6	191.6
22	15.6	15.6	72	50.9	50.9	22	86.3	86.3	72	121.6	121.6	22	157.0	157.0	72	192.3	192.3
23	16.3	16.3	73	51.6	51.6	23	87.0	87.0	73	122.3	122.3	23	157.7	157.7	73	193.0	193.0
24	17.0	17.0	74	52.3	52.3	24	87.7	87.7	74	123.0	123.0	24	158.4	158.4	74	193.7	193.7
25	17.7	17.7	75	53.0	53.0	25	88.4	88.4	75	123.7	123.7	25	159.1	159.1	75	194.4	194.4
26	18.4	18.4	76	53.7	53.7	126	89.1	89.1	176	124.4	124.4	226	159.8	159.8	276	195.2	195.2
27	19.1	19.1	77	54.4	54.4	27	89.8	89.8	77	125.2	125.2	27	160.5	160.5	77	195.9	195.9
28	19.8	19.8	78	55.2	55.2	28	90.5	90.5	78	125.9	125.9	28	161.2	161.2	78	196.6	196.6
29	20.5	20.5	79	55.9	55.9	29	91.2	91.2	79	126.6	126.6	29	161.9	161.9	79	197.3	197.3
30	21.2	21.2	80	56.6	56.6	30	91.9	91.9	80	127.3	127.3	30	162.6	162.6	80	198.0	198.0
31	21.9	21.9	81	57.3	57.3	131	92.6	92.6	181	128.0	128.0	231	163.3	163.3	281	198.7	198.7
32	22.6	22.6	82	58.0	58.0	32	93.3	93.3	82	128.7	128.7	32	164.0	164.0	82	199.4	199.4
33	23.3	23.3	83	58.7	58.7	33	94.0	94.0	83	129.4	129.4	33	164.7	164.7	83	200.1	200.1
34	24.0	24.0	84	59.4	59.4	34	94.7	94.7	84	130.1	130.1	34	165.5	165.5	84	200.8	200.8
35	24.7	24.7	85	60.1	60.1	35	95.5	95.5	85	130.8	130.8	35	166.2	166.2	85	201.5	201.5
36	25.5	25.5	86	60.8	60.8	136	96.2	96.2	186	131.5	131.5	236	166.9	166.9	286	202.2	202.2
37	26.2	26.2	87	61.5	61.5	37	96.9	96.9	87	132.2	132.2	37	167.6	167.6	87	202.9	202.9
38	26.9	26.9	88	62.2	62.2	38	97.6	97.6	88	132.9	132.9	38	168.3	168.3	88	203.6	203.6
39	27.6	27.6	89	62.9	62.9	39	98.3	98.3	89	133.6	133.6	39	169.0	169.0	89	204.3	204.3
40	28.3	28.3	90	63.6	63.6	40	99.0	99.0	90	134.3	134.3	40	169.7	169.7	90	205.1	205.1
41	29.0	29.0	91	64.3	64.3	141	99.7	99.7	191	135.1	135.1	241	170.4	170.4	291	205.8	205.8
42	29.7	29.7	92	65.1	65.1	42	100.4	100.4	92	135.8	135.8	42	171.1	171.1	92	206.5	206.5
43	30.4	30.4	93	65.8	65.8	43	101.1	101.1	93	136.5	136.5	43	171.8	171.8	93	207.2	207.2
44	31.1	31.1	94	66.5	66.5	44	101.8	101.8	94	137.2	137.2	44	172.5	172.5	94	207.9	207.9
45	31.8	31.8	95	67.2	67.2	45	102.5	102.5	95	137.9	137.9	45	173.2	173.2	95	208.6	208.6
46	32.5	32.5	96	67.9	67.9	146	103.2	103.2	196	138.6	138.6	246	173.9	173.9	296	209.3	209.3
47	33.2	33.2	97	68.6	68.6	47	103.9	103.9	97	139.3	139.3	47	174.6	174.6	97	210.0	210.0
48	33.9	33.9	98	69.3	69.3	48	104.6	104.6	98	140.0	140.0	48	175.4	175.4	98	210.7	210.7
49	34.6	34.6	99	70.0	70.0	49	105.4	105.4	99	140.7	140.7	49	176.1	176.1	99	211.4	211.4
50	35.4	35.4	100	70.7	70.7	150	106.1	106.1	200	141.4	141.4	250	176.8	176.8	300	212.1	212.1
Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat

for 45 Deg.

Numbers for the reader finding the Course in the foregoing
Tables of Difference of Latitude and Departure.

Diff. and Diff. of Lat.				Diff. and Departure				Diff. of Lat. and Dep.			
N ^o	Deg.	N ^o	Deg.	N ^o	Deg.	N ^o	Deg.	N ^o	Deg.	N ^o	Deg.
1000	1	17	89	17	1	1000	89	2	1	5882	89
999	2	35	88	3	2	999	88	3	2	2855	88
998	3	52	87	5	3	998	87	5	3	1908	87
997	4	70	86	70	4	997	86	7	4	1432	86
996	5	87	85	87	5	996	85	9	5	1145	85
995	6	105	84	105	6	995	84	10	6	950	84
993	7	122	83	122	7	993	83	12	7	816	83
990	8	139	82	139	8	990	82	14	8	711	82
988	9	156	81	156	9	988	81	16	9	632	81
985	10	173	80	173	10	985	80	18	10	568	80
982	11	191	79	191	11	982	79	19	11	515	79
978	12	208	78	208	12	978	78	21	12	470	78
974	13	225	77	225	13	974	77	23	13	433	77
970	14	242	76	242	14	970	76	25	14	401	76
966	15	259	75	259	15	966	75	27	15	373	75
961	16	276	74	276	16	961	74	29	16	349	74
956	17	292	73	292	17	956	73	30	17	328	73
951	18	309	72	309	18	951	72	32	18	308	72
945	19	326	71	326	19	945	71	34	19	290	71
940	20	342	70	342	20	940	70	36	20	275	70
934	21	358	69	358	21	934	69	38	21	260	69
927	22	375	68	375	22	927	68	40	22	248	68
921	23	391	67	391	23	921	67	42	23	236	67
914	24	407	66	407	24	914	66	45	24	225	66
906	25	423	65	423	25	906	65	47	25	214	65
899	26	438	64	438	26	899	64	49	26	205	64
891	27	454	63	454	27	891	63	51	27	196	63
883	28	470	62	470	28	883	62	53	28	188	62
875	29	485	61	485	29	875	61	55	29	180	61
866	30	500	60	500	30	866	60	58	30	173	60
857	31	515	59	515	31	857	59	60	31	166	59
848	32	530	58	530	32	848	58	62	32	160	58
839	33	545	57	545	33	839	57	65	33	154	57
829	34	559	56	559	34	829	56	67	34	148	56
819	35	574	55	574	35	819	55	70	35	143	55
809	36	588	54	588	36	809	54	73	36	138	54
799	37	602	53	602	37	799	53	75	37	133	53
788	38	616	52	616	38	788	52	78	38	128	52
777	39	629	51	629	39	777	51	81	39	123	51
766	40	643	50	643	40	766	50	84	40	119	50
755	41	656	49	656	41	755	49	87	41	115	49
743	42	669	48	669	42	743	48	90	42	111	48
731	43	682	47	682	43	731	47	93	43	107	47
719	44	695	46	695	44	719	46	96	44	103	46
707	45	707	45	707	45	707	45	100	45	100	45

The Use of the Table of Difference of Latitude and Departure in working any of the Cases of Plain Sailing.

IN these Tables, the Course if less than 4 Points, or 45 Degrees, will be found at the Top of the Tables; but, if it is more than 4 Points, or 45 Degrees, it will be found at the Bottom of the Tables; and on every Side there are six Columns for the Distances, marked Dist. which contains 50 Miles in each Column, the first beginning at 1, and at 50; the second beginning at 51, and ending at 100; and so on to 300 Miles Distance; and to each of the Columns of Distance there belongs two other Columns, shewing the Difference of Latitude and Departure to any of the Distances marked Lat. and Dep. in which you are to observe, that if your Course be found at the Top of the Tables, then you are to take the Difference of Latitude and Departure as they are marked at Top; but if your Course be found at Bottom, then you must take them as they are marked at Bottom.

Note, If any Case where the Course is given in Points, half Points, or Quarters, you must make use of the following Tables of Difference of Latitude and Departure, which are calculated for Points, &c. but where the Course is given in Degrees, or where it is not given at all, you must make use of the foregoing Tables of Difference of Latitude and Departure.

P L A I N S A I L I N G.

C A S E the First.

Course and Distance being given, to find the Difference of Latitude and Departure.

R U L E.

Find your Course as before directed, and look in some of the Distance Columns belonging to that Course, for your Distance, the Difference of Latitude and Departure answering to that Distance, will be the Difference of Latitude and Departure required.

EXAMPLE

EXAMPLE I.

A Ship sails N.N.E. 136 Miles, I demand her Difference of Latitude and Departure.

Having found my Course, which is 2 Points in the Table for Points, I find my Distance 136 in the 3^d Column for the Distances, and right against that, I find 125.7 Tenths for my Difference of Latitude, and 52.0 Tenths for my Departure.

Note, In all Cases whatsoever, if the given Side or Sides be in Miles, then the Sides found by the Table, will also be in Miles; but if the given Side or Sides be Leagues, then the Sides found will also be Leagues.

Plain Sailing, Case the Second.

Course and Difference of Latitude being given, to find the Distance and Departure

R U L E.

Find your Course as before, then look in some of the Difference of Latitude Columns belonging to that Course, for your Difference of Latitude, the Distance and Departure answering to that Difference of Latitude, will be the Distance and Departure required.

EXAMPLE II.

A Ship sails S. 48 Degrees 00 Minutes E. till her Difference of Latitude be 164 Leagues, I demand her Distance and Departure.

Having found my Course 48 Deg. at the Bottom of the Table in Page 42, I look in some of the Columns mark'd Lat. at Bottom, for the nearest I can find to my Difference of Latitude, which is 163.9, and answering to that, I find for my Distance 245 Leagues, and for my Departure 182.0 Leagues.

Plain Sailing, Case the Third.

Course and Departure being given, to find the Distance and Difference of Latitude.

R U L E.

Find your Course as before, then look in some of the Departure Columns belonging to that Course, for your Departure, the Distance and

and Difference of Latitude answering to that Departure, will be the Distance and Difference of Latitude required.

E X A M P L E.

A Ship sails South West by South until her Departure be 165 Miles. I demand her Distance and Difference of Latitude.

Having found the Course, which is 3 Points at the Top of the Table for Points, in Page 69, I look in some of the Columns marked Dep. at Top, for the nearest I can find to my Departure, which 165.0, and answering to that, I find for my Distance 297 Miles, and for my Difference of Latitude 246.9 Miles.

Note, In any Case where the given Side is too large to be found in the Tables, then divide it by 2, 3, 4, or any other Number that will reduce it enough to be found, and then the required Sides, when found, must be multiplied by the same Number; but the Course must never be multiplied nor divided.

Plane Sailing. Case the Fourth.

Distance and Difference of Latitude being given, to find the Course and Departure.

R U L E.

Put two Cyphers to the Difference of Latitude, and divide it by the Distance (without taking any Notice of the Comma that stands between the Miles and Tenths) and note the Quotient: Then look into the Table of Numbers, at the End of the Tables of Difference of Latitude and Departure, in the Columns belonging to Distance and Difference of Latitude, for the nearest Number to that Quotient, the Degrees answering to that Number will be the Course. Then to find the Departure, proceed as in Case I. But here you are to observe, that in all Cases where the Course is to be found by the Table of Numbers, the Difference of Latitude and Departure are supposed always to be in Miles and Tenths; as for Example, 112.4 Tenths, 207.9 Tenths, &c. so that if at any Time either of them should be given in Miles without Tenths; as 117, 124, &c. you are then to put a Cypher to them, to supply the Place of Tenths, and call them 117.0 Tenths, 124.0 Tenths, &c. and then put two Cyphers more according to your other Rules to find the Number for the Course.

H

EXAMPLE

E X A M P L E.

A Ship sails between the North and West, until her Distance is 276 Miles, and her Difference of Latitude 211.4 Miles, I demand her Course and Departure.

Having put two Cyphers to the Difference of Latitude, which makes it 211400; I divide by the Distance 276, and find the Quotient to be 766 nearly; then I look into the Table of Numbers, under *Dist.* and *Diff. of Lat.* in Page 46) for the nearest to it, which is 766, against which I find 40 Degrees for my Course, and with that Course, and my given Distance, I find my Departure to be 177.4 Miles, by Case the first.

Plane Sailing. Case the Fifth.

Distance and Departure being given, to find the Course and Difference of Latitude.

R U L E.

Put two Cyphers to the Departure, then divide it by the Distance, and look in the Table of Numbers, in the Columns belonging to Distance and Departure, for the nearest Number to the Quotient; the Degrees answering to that Number will be the Course, and then the Difference of Latitude may be found by Case the first.

E X A M P L E.

A Ship sails between the South and East, until her Distance is 546 Miles, and her Departure 412 Miles, I demand her Course and Difference of Latitude.

Having put a Cypher to my Departure to supply the Place of Tenths, which makes it 412.0 and then two more Cyphers, according to the Rule for this Case, which makes it 412000, I divide it by the Distance 546, and find the Quotient to be 754, against the nearest to which, viz. 755 in the Table of Numbers, under *Dist.* and *Dep.* in Page 46, I find 49 Degrees for my Course; and with that Course, and my Distance (divided by 2, because it is too large to be found in the Tables) I find a Difference of Latitude 179.1 (Page 41, by Case the first) which multiplied by 2, because the Distance was divided by 2, gives 358.2 for the whole Difference of Latitude.

Plane

Plane Sailing. Case the Sixth.

Difference of Latitude and Departure being given, to find the Course and Distance.

R U L E.

Put two Cyphers to the Departure, and divide it by the Difference of Latitude, then look in the Table of Numbers, in the Columns belonging to Difference of Latitude and Departure, for the nearest Number to the Quotient, the Degrees answering to that Number will be the Course; then to find the Distance, proceed as in Case the Second or Third.

E X A M P L E.

A Ship sails between the North and West, till her Difference of Latitude is 184 Miles, and her Departure 115 Miles, I demand her Course and Distance.

Having supplied the Place of Tenths in both these Sides, which makes them 184.0 and 115.0, I then put two Cyphers to the Departure, which makes it 115000, and divide it by the Difference of Latitude 1840, and find the Quotient to be 62; against which, in the Table of Numbers, under Difference of Latitude and Departure, I find 32 Degrees for my Course, and with that Course, and my Difference of Latitude, (by Case the Second) or with that Course, and my Departure (by Case the Third) I find my Distance to be 217 Miles.

Note, By these foregoing Rules for *Plane Sailing*, you may work any Case in *Traverse*, *Mercator*, *Parallel*, or *Middle Latitude*, only by supposing the Names of the Sides and Angles in *Mercator*, *Parallel*, and *Middle Latitude*, to be changed into the Sides and Angles they represent in *Plane Sailing*.

T R A V E R S E S A I L I N G.

The several Courses and Distances a Ship sails being given, to find what direct Course and Distance she has made good, and her Difference of Latitude and Departure.

R U L E.

Make a Table as on the following Side, and set down in it your several Courses and Distances; then, by the Rule for Case the first of *Plane Sailing*, find the Difference of Latitude and Departure to each

of the Courses and Distances, and set them down in the Table opposite to the Courses they belong to, taking Notice that the Difference of Latitude must always be set in the North Column, if the Course be Northerly, and in the South Column, if the Course be Southerly; and the Departure must always be put in the East Column, if the Course be Easterly, and in the West Column, if it be Westerly.

Then add up all your Columns of North, South, East, and West, separately, and set down their respective Sums at the Bottom of each Column; and if you have but one Column of Northing or Southing, and but one of Easting or Westing, then their Sums will shew the Difference of Latitude and Departure of the same Name with the Column they stand under: That is, the Difference of Latitude will be Northerly, if it stands under the North Column; and the Departure Easterly, if it stands under the East Column, &c.

But if you have Numbers in all the Columns of North, South, East, and West, then take the Sums of the North and South Columns, and subtract the Less from the Greater, the Remainder will be the Difference of Latitude, of the same Name with the greater of them: Also do the same with the Sums of the East and West Columns for the Departure; then, with that Difference of Latitude and Departure, find the Course and Distance, as in Case the Sixth of *Plane Sailing*,

E X A M P L E.

A Ship sails the following Courses, viz. SSW. 54 Miles, W. by S. 39, NW. by N. 40, NE. by E. 69, and NNW. 60 Miles, I demand her direct Course, Distance, Difference of Latitude, and Departure.

Courses	Diff.	Diff. of Lat.		Departure	
		North	South	East	West.
SSW	54		49.9		20.7
W by S	39		7.6		38.2
NW by N	40	33.3			22.2
NE by E	69	38.3		57.4	
NNW	60	55.4			23.0
		127.0	57.5	57.4	104.1
		57.5			57.4
Diff. Lat	N.ly	69.5	DepW.erly		46.7

Distance 84 Miles.

Note, 'Tis by this Method that the Difference of Latitude and Departure are found in working any Day's Work at Sea; and from the Difference of Latitude and Departure so found, we find the Course, Distance and Latitude by Dead-Reckoning, Meridian Distance and Longitude made; all which will be further explained in the Rules for keeping a Journal. Course N.34.00 W.

To work any Right-angled Triangle by the foregoing Rules for PLANE SAILING.

In all Right-angled Triangles which are to be worked by the Tables, you are to suppose four Things, *viz.* Course, Distance, Difference of Latitude, and Departure; two of which must always be given to find the other two: Then, as these Rules are designed for working of *Plane Sailing*, if you would work any other sailing by them, as Mercator, Parallel, Middle Latitude, or any other Right-angled Triangle, you must suppose the Sides and Angles of that Triangle are called by the same Name as the Sides and Angles they represent in *Plane Sailing* are called by, and then work with them as if it was a Case of *Plane Sailing*.

As for Example. The North and South Line in any Right-angled Triangle (by whatever Name it is called in the Sailing it belongs to) must be worked as if it was Difference of Latitude in *Plane Sailing*: The East and West Line as Departure; the longest Side as Distance, and the Angle opposite to the East and West Line as Course. For Example, see the following Figures.

Figure for Mercator's Sailing.

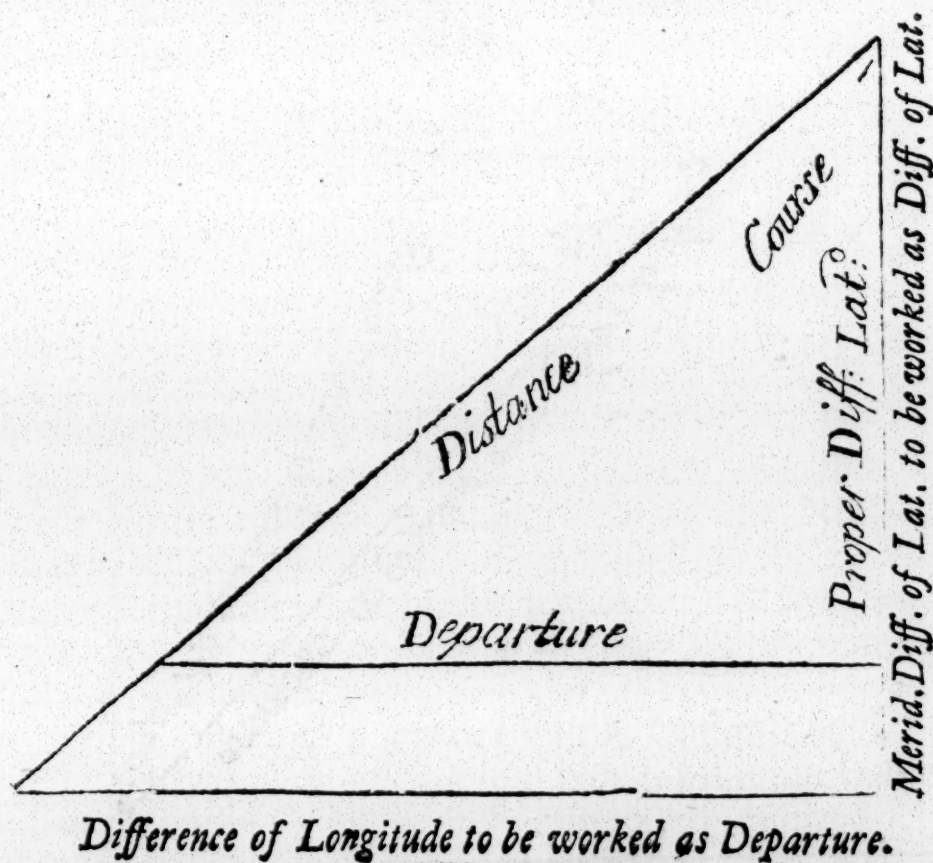
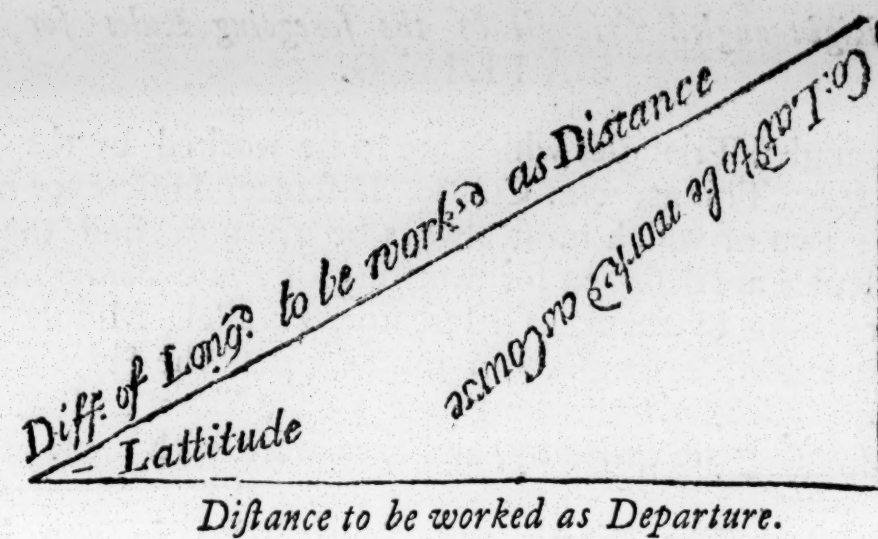
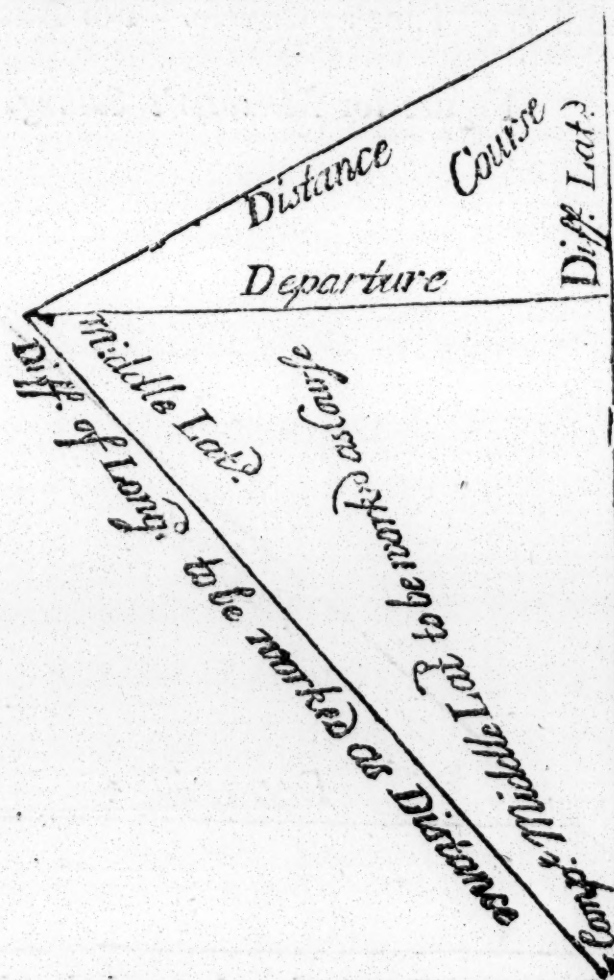


Fig.

Figure for *Parallel Sailing*.Figure for *Middle Latitude Sailing*.

Mercator's Sailing. Case the First.

When the Latitudes and Longitudes of any two Places being given, to find what Course and Distance a Ship must sail from one Place to another.

R U L E.

Having the two Latitudes and two Longitudes given, find the proper Difference of Latitude, the Meridional Difference of Latitude, and the Difference of Longitude, as by the Rules for that Purpose; then, with the Meridional Difference of Latitude, and the Difference of Longitude, (taken as Difference of Latitude and Departure) find the Course by the Sixth Case of *Plane Sailing*, and with that Course, and the proper Difference of Latitude, find the Distance by Case the Second of *Plane Sailing*.

E X A M P L E.

What Course and Distance must a Ship sail from a Place in Latitude 50.00 North, and Longitude 03.10 West, to a Place in Latitude of 17.10 North, and Longitude 59.11 West.

Lat. sailed from	50 00 N.		Meridional Parts.		Long. sailed from	03 10 W.
Lat. bound to	17 10 N	}	3474	{	Long. bound to	59 11 W.
	32 50 S.		1045			56 01 W.
	60		Mer. Diff. of Lat.			60
Proper Diff. of Lat.	1970 Miles.				Difference of Long.	3361 Miles.

Having put two Cyphers to the Difference of Longitude, and divided it by the Meridional Difference of Latitude, I find the Quotient to be 138, against which, in the Table of Numbers (under Difference of Latitude and Departure) I find 54 Degrees for my Course, and with that Course, and my proper Difference of Latitude, I find my Distance to be 3348 Miles.

The Course being thus found in Degrees, I want, in the next Place, to know which quarter of the Compass it is in, that is, whether it be so many Degrees from the North towards the East, or from the North towards the West, &c. To do which, take the following Rule.

If you are to sail from a greater North Latitude to a less, or from North Latitude into South; or from a lesser South Latitude to a greater, then you must sail to the Southward.

But if you are to sail from a greater South Latitude to a less, or from South Latitude into North; or from a less North Latitude to a greater, you must sail Northward.

If

If you are to sail from a greater East Longitude to a less, or from a less West Longitude to a greater, or from East Longitude into West, you must sail to the Westward, except the Difference of Longitude be more than 180 Degrees, and then you must sail to the Eastward.

But if you are to go from a greater West Longitude to a less, or from a less East Longitude to a greater, or from West Longitude into East, you must sail to the Eastward, except your Difference of Longitude be more than 180 Degrees, and then you must sail to the Westward.

E X A M P L E.

In the foregoing Case of Mercator's Sailing, I find by the two Latitudes that I am bound from a greater North Latitude to a less, *viz.* from 50.00 N. to 17.10 North, then by the Rule I must sail to the Southward; and I find by the two Longitudes that I am bound from a less West Longitude to a greater, *viz.* from 3.10 West to 59.11 West; then by that Rule I am to go to the Westward, therefore my Course will be South 54.00 West, or SW. three Quarters West nearest.

This first Case of Mercator, being the Case that is always made Use of to find the Course and Distance from Place to Place, or to find the Bearing and Distance of any Place from the Ship at any Time, I have set down the Work of it at large, and shall leave the other Cases for the Reader to exercise himself with, by working them by the Rules already given him.

A Table of the Angles which every Point and Quarter Point of the Compass makes with the Meridian.

	D	M		D	M		D	M		D	M
$\frac{1}{4}$	2	49	$2\frac{1}{4}$	25	19	$4\frac{1}{4}$	47	49	$6\frac{1}{4}$	70	19
$\frac{1}{2}$	5	37	$2\frac{1}{2}$	28	07	$4\frac{1}{2}$	50	38	$6\frac{1}{2}$	73	07
$\frac{3}{4}$	8	20	$2\frac{3}{4}$	30	56	$4\frac{3}{4}$	53	26	$6\frac{3}{4}$	75	56
1	11	15	3	33	45	5	56	15	7	78	45
$1\frac{1}{4}$	14	04	$3\frac{1}{4}$	36	34	$5\frac{1}{4}$	59	04	$7\frac{1}{4}$	81	34
$1\frac{1}{2}$	16	52	$3\frac{1}{2}$	39	22	$5\frac{1}{2}$	61	53	$7\frac{1}{2}$	84	23
$1\frac{3}{4}$	19	41	$3\frac{3}{4}$	42	11	$5\frac{3}{4}$	64	41	$7\frac{3}{4}$	87	11
2	22	30	4	45	02	6	67	30	8	90	09

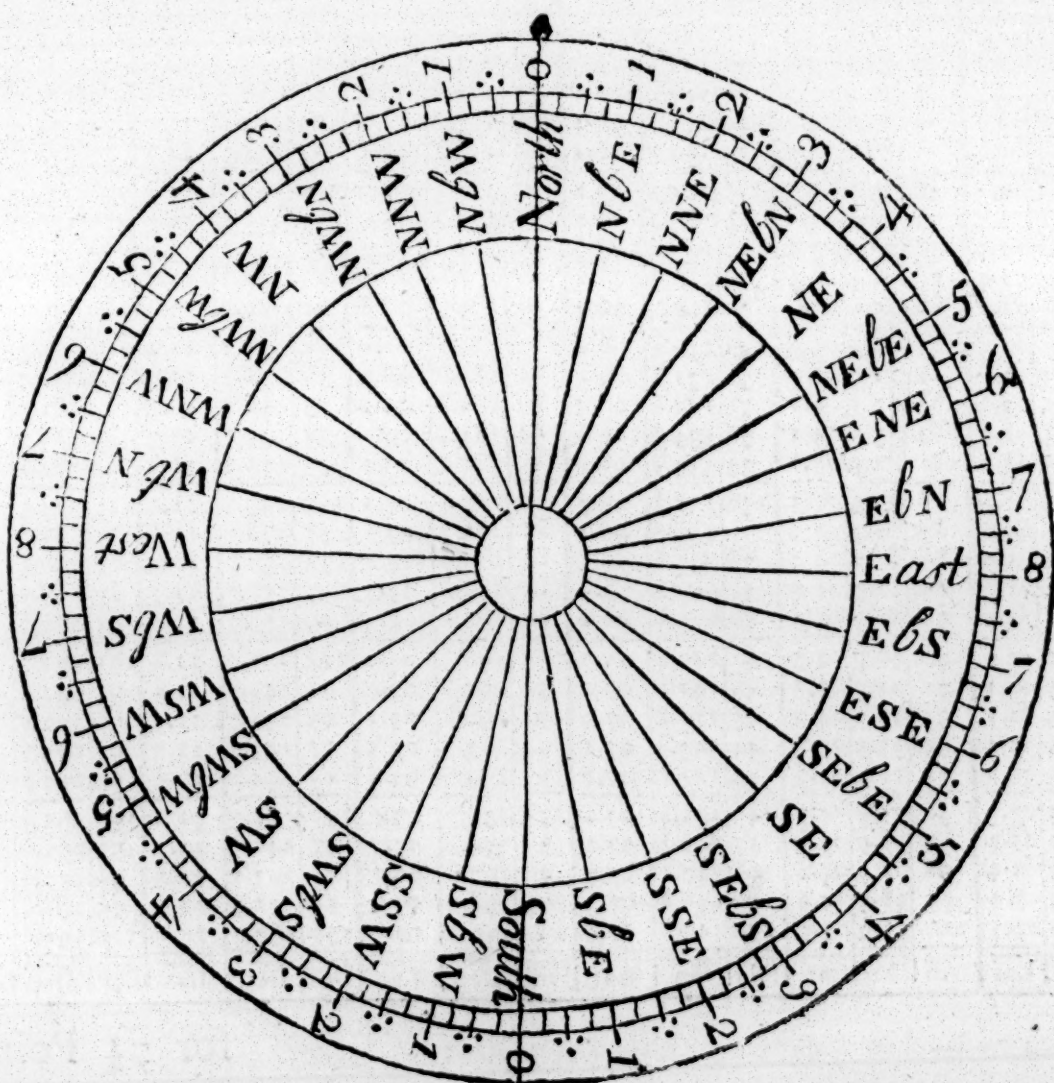
The Use of this Table is to turn Points into Degrees, or Degrees into Points, as follows: Suppose I would know how many Degrees 5 Points are, then I look for 5 Points, and against it I find 56 Deg. 15 Min. Or, if I would know how many Points 42 Deg. 17 Min. are, I look for the nearest to it, which is 42 Deg. 11 Min. and against that stands $3\frac{3}{4}$ Points.

The Course and Distance being set down in a Traverse-Table, as in Page (52) it will be found necessary for the ready looking them out in the Table of Difference of Latitude and Departure, to know what Angles they make with the Meridian, (or as we commonly say) to know how many Points there are, for which Reason I have here given the Figure of the Mariner's Compass, which is to be used as follows.

Example 1st. Suppose I would know how many Points I must look out for in the Tables of Difference of Latitude and Departure, for a SW. by W. Course.

Look in the Figure below, and against the Point mark'd with SW. by W. you will see the Figure 5, which shews that you must look out for 5 Points.

Example 2d. How many Points is E. by N. $\frac{3}{4}$ E. against E. by N. I find 7, and my Course being $\frac{3}{4}$ Points more, it makes $7\frac{3}{4}$.



58 Difference of Latitude and Departure for $\frac{1}{4}$ Point.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.0	51	50.9	02.5	101	100.9	05.0	151	150.8	07.4	201	200.8	09.9	251	250.7	12.3
2	02.0	00.1	52	51.9	02.6	102	101.9	05.0	152	151.8	07.5	202	201.8	09.9	252	251.7	12.4
3	03.0	00.1	53	52.9	02.6	103	102.9	05.1	153	152.8	07.5	203	202.8	10.0	253	252.7	12.4
4	04.0	00.2	54	53.9	02.7	104	103.9	05.1	154	153.8	07.6	204	203.8	10.0	254	253.7	12.5
5	05.0	00.2	55	54.9	02.7	105	104.9	05.2	155	154.8	07.6	205	204.8	10.1	255	254.7	12.5
6	06.0	00.3	56	55.9	02.7	106	105.9	05.2	156	155.8	07.7	206	205.8	10.1	256	255.7	12.6
7	07.0	00.3	57	56.9	02.8	107	106.9	05.3	157	156.8	07.7	207	206.8	10.2	257	256.7	12.6
8	08.0	00.4	58	57.9	02.8	108	107.9	05.3	158	157.8	07.8	208	207.8	10.2	258	257.7	12.7
9	09.0	00.4	59	58.9	02.9	109	108.9	05.4	159	158.8	07.8	209	208.7	10.3	259	258.7	12.7
10	10.0	00.5	60	59.9	02.9	110	109.9	05.4	160	159.8	07.9	210	209.7	10.3	260	259.7	12.8
11	11.0	00.5	61	60.9	03.0	111	110.9	05.5	161	160.8	07.9	211	210.7	10.4	261	260.7	12.8
12	12.0	00.6	62	61.9	03.0	112	111.9	05.5	162	161.8	08.0	212	211.7	10.4	262	261.7	12.9
13	13.0	00.6	63	62.9	03.1	113	112.9	05.5	163	162.8	08.0	213	212.7	10.5	263	262.7	12.9
14	14.0	00.7	64	63.9	03.1	114	113.9	05.6	164	163.8	08.1	214	213.7	10.5	264	263.7	13.0
15	15.0	00.7	65	64.9	03.2	115	114.9	05.6	165	164.8	08.1	215	214.7	10.6	265	264.7	13.0
16	16.0	00.8	66	65.9	03.2	116	115.9	05.7	166	165.8	08.2	216	215.7	10.6	266	265.7	13.1
17	17.0	00.8	67	66.9	03.3	117	116.9	05.7	167	166.8	08.2	217	216.7	10.7	267	266.7	13.1
18	18.0	00.9	68	67.9	03.3	118	117.9	05.8	168	167.8	08.3	218	217.7	10.7	268	267.7	13.2
19	19.0	00.9	69	68.9	03.4	119	118.9	05.8	169	168.8	08.3	219	218.7	10.8	269	268.7	13.2
20	20.0	01.0	70	69.9	03.4	120	119.9	05.9	170	169.8	08.4	220	219.7	10.8	270	269.7	13.3
21	21.0	01.0	71	70.9	03.5	121	120.9	05.9	171	170.8	08.4	221	220.7	10.9	271	270.7	13.3
22	22.0	01.1	72	71.9	03.5	122	121.9	06.0	172	171.8	08.5	222	221.7	10.9	272	271.7	13.4
23	23.0	01.1	73	72.9	03.6	123	122.9	06.0	173	172.8	08.5	223	222.7	11.0	273	272.7	13.4
24	24.0	01.2	74	73.9	03.6	124	123.9	06.1	174	173.8	08.5	224	223.7	11.0	274	273.7	13.5
25	25.0	01.2	75	74.9	03.7	125	124.9	06.1	175	174.8	08.6	225	224.7	11.1	275	274.7	13.5
26	26.0	01.3	76	75.9	03.7	126	125.8	06.2	176	175.8	08.6	226	225.7	11.1	276	275.7	13.6
27	27.0	01.3	77	76.9	03.8	127	126.8	06.2	177	176.8	08.7	227	226.7	11.2	277	276.7	13.6
28	28.0	01.4	78	77.9	03.8	128	127.8	06.3	178	177.8	08.7	228	227.7	11.2	278	277.7	13.7
29	29.0	01.4	79	78.9	03.9	129	128.8	06.3	179	178.8	08.8	229	228.7	11.3	279	278.7	13.7
30	30.0	01.5	80	79.9	03.9	130	129.8	06.4	180	179.8	08.8	230	229.7	11.3	280	279.7	13.8
31	31.0	01.5	81	80.9	04.0	131	130.8	06.4	181	180.8	08.9	231	230.7	11.4	281	280.7	13.8
32	32.0	01.6	82	81.9	04.0	132	131.8	06.5	182	181.8	08.9	232	231.7	11.4	282	281.7	13.9
33	33.0	01.6	83	82.9	04.1	133	132.8	06.5	183	182.8	09.0	233	232.7	11.5	283	282.7	13.9
34	34.0	01.7	84	83.9	04.1	134	133.8	06.6	184	183.8	09.0	234	233.7	11.5	284	283.7	14.0
35	35.0	01.7	85	84.9	04.2	135	134.8	06.6	185	184.8	09.1	235	234.7	11.5	285	284.7	14.0
36	36.0	01.8	86	85.9	04.2	136	135.8	06.7	186	185.8	09.1	236	235.7	11.6	286	285.7	14.1
37	37.0	01.8	87	86.9	04.3	137	136.8	06.7	187	186.8	09.2	237	236.7	11.6	287	286.7	14.1
38	38.0	01.9	88	87.9	04.3	138	137.8	06.8	188	187.8	09.2	238	237.7	11.7	288	287.7	14.2
39	39.0	01.9	89	88.9	04.4	139	138.8	06.8	189	188.8	09.3	239	238.7	11.7	289	288.7	14.2
40	40.0	02.0	90	89.9	04.4	140	139.8	06.9	190	189.8	09.3	240	239.7	11.8	290	289.7	14.3
41	41.0	02.0	91	90.9	04.5	141	140.8	06.9	191	190.8	09.4	241	240.7	11.8	291	290.7	14.3
42	41.9	02.1	92	91.9	04.5	142	141.8	07.0	192	191.8	09.4	242	241.7	11.9	292	291.6	14.4
43	42.9	02.1	93	92.9	04.6	143	142.8	07.0	193	192.8	09.5	243	242.7	11.9	293	292.6	14.4
44	43.9	02.2	94	93.9	04.6	144	143.8	07.1	194	193.8	09.5	244	243.7	12.0	294	293.6	14.5
45	44.9	02.2	95	94.9	04.7	145	144.8	07.1	195	194.8	09.6	245	244.7	12.0	295	294.6	14.5
46	45.9	02.3	96	95.9	04.7	146	145.8	07.2	196	195.8	09.6	246	245.7	12.1	296	295.6	14.5
47	46.9	02.3	97	96.9	04.8	147	146.8	07.2	197	196.8	09.7	247	246.7	12.1	297	296.6	14.6
48	47.9	02.4	98	97.9	04.8	148	147.8	07.3	198	197.8	09.7	248	247.7	12.2	298	297.6	14.6
49	48.9	02.4	99	98.9	04.9	149	148.8	07.3	199	198.8	09.8	249	248.7	12.2	299	298.6	14.7
50	49.9	02.5	100	99.9	04.9	150	149.8	07.4	200	199.8	09.8	250	249.7	12.3	300	299.6	14.7
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for $7\frac{3}{4}$ Points

Difference of Latitude and Departure for ½ Points

59

Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep	Diff	Lat	Dep
1	01.0	00.1	51	50.8	05.0	101	100.5	09.9	151	150.3	14.8	201	200.0	19.7	251	249.8	24.6
2	02.0	00.2	52	51.8	05.1	02	101.5	10.0	52	151.3	14.9	02	201.0	19.8	52	250.8	24.7
3	03.0	00.3	53	52.7	05.2	03	102.5	10.1	53	152.3	15.0	03	202.0	19.9	53	251.8	24.8
4	04.0	00.4	54	53.7	05.3	04	103.5	10.2	54	153.3	15.1	04	203.0	20.0	54	252.8	24.9
5	05.0	00.5	55	54.7	05.4	05	104.5	10.3	55	154.3	15.2	05	204.0	20.1	55	253.8	25.0
6	06.0	00.6	56	55.7	05.5	106	105.5	10.4	156	155.3	15.3	206	205.0	20.2	156	254.8	25.1
7	07.0	00.7	57	56.7	05.6	07	106.5	10.5	57	156.2	15.4	07	206.0	20.2	57	255.8	25.2
8	08.0	00.8	58	57.7	05.7	08	107.5	10.6	58	157.2	15.5	08	207.0	20.3	58	256.8	25.3
9	09.0	00.9	59	58.7	05.8	09	108.5	10.7	59	158.2	15.6	09	208.0	20.4	59	257.8	25.4
10	10.0	01.0	60	59.7	05.9	10	109.5	10.8	60	159.2	15.7	10	209.0	20.5	60	258.8	25.5
11	10.9	01.1	61	60.7	06.0	111	110.5	10.9	161	160.2	15.7	211	210.0	20.6	261	259.7	25.6
12	11.9	01.2	62	61.7	06.1	12	111.5	11.0	62	161.2	15.8	12	211.0	20.7	62	260.7	25.7
13	12.9	01.3	63	62.7	06.2	13	112.5	11.1	63	162.2	15.9	13	212.0	20.8	63	261.7	25.8
14	13.9	01.4	64	63.7	06.3	14	113.5	11.2	64	163.2	16.0	14	213.0	20.9	64	262.7	25.9
15	14.9	01.5	65	64.7	06.4	15	114.4	11.2	65	164.2	16.1	15	214.0	21.0	65	263.7	26.0
16	15.9	01.6	66	65.7	06.5	116	115.4	11.3	166	165.2	16.2	216	215.0	21.1	266	264.7	26.1
17	16.9	01.7	67	66.7	06.6	17	116.4	11.4	67	166.2	16.3	17	216.0	21.2	67	265.7	26.2
18	17.9	01.8	68	67.7	06.7	18	117.4	11.5	68	167.2	16.4	18	217.0	21.3	68	266.7	26.3
19	18.9	01.9	69	68.7	06.7	19	118.4	11.6	69	168.2	16.5	19	217.9	21.4	69	267.7	26.4
20	19.9	02.0	70	69.7	06.8	20	119.4	11.7	70	169.2	16.6	20	218.9	21.5	70	268.7	26.5
21	20.9	02.1	71	70.7	07.9	121	120.4	11.8	171	170.2	16.7	221	219.9	21.6	271	269.7	26.6
22	21.9	02.2	72	71.7	07.0	22	121.4	11.9	72	171.2	16.8	22	220.9	21.7	72	270.7	26.7
23	22.9	02.2	73	72.6	07.1	23	122.4	12.0	73	172.2	16.9	23	221.9	21.8	73	271.7	26.8
24	23.9	02.3	74	73.6	07.2	24	123.4	12.1	74	173.2	17.0	24	222.9	21.9	74	272.7	26.9
25	24.9	02.4	75	74.6	07.3	25	124.4	12.2	75	174.2	17.1	25	223.9	22.0	75	273.7	27.0
26	25.9	02.5	76	75.6	07.4	126	125.4	12.3	176	175.2	17.2	226	224.9	22.1	276	274.7	27.1
27	26.9	02.6	77	76.6	07.5	27	126.4	12.4	77	176.2	17.3	27	225.9	22.2	77	275.7	27.2
28	27.9	02.7	78	77.6	07.6	28	127.4	12.5	78	177.1	17.4	28	226.9	22.3	78	276.7	27.3
29	28.9	02.8	79	78.6	07.7	29	128.4	12.6	79	178.1	17.5	29	227.9	22.4	79	277.7	27.4
30	29.9	02.9	80	79.6	07.8	30	129.4	12.7	80	179.1	17.6	30	228.9	22.5	80	278.7	27.5
31	30.9	03.0	81	80.6	08.9	131	130.4	12.8	181	180.1	17.7	231	229.9	22.6	281	279.6	27.6
32	31.8	03.1	82	81.6	08.0	32	131.4	12.9	82	181.1	17.8	32	230.9	22.7	82	280.6	27.7
33	32.8	03.2	83	82.6	08.1	33	132.4	13.0	83	182.1	17.9	33	231.9	22.8	83	281.6	27.8
34	33.8	03.3	84	83.6	08.2	34	133.4	13.1	84	183.1	18.0	34	232.9	22.9	84	282.6	27.9
35	34.8	03.4	85	84.6	08.3	35	134.4	13.2	85	184.1	18.1	35	233.9	23.0	85	283.6	28.0
36	35.8	03.5	86	85.6	08.4	136	135.3	13.3	186	185.1	18.2	236	234.9	23.1	286	284.6	28.1
37	36.8	03.6	87	86.6	08.5	37	136.3	13.4	87	186.1	18.3	37	235.9	23.2	87	285.6	28.2
38	37.8	03.7	88	87.6	08.6	38	137.3	13.5	88	187.1	18.4	38	236.9	23.3	88	286.6	28.3
39	38.8	03.8	89	88.6	08.7	39	138.3	13.6	89	188.1	18.5	39	237.9	23.4	89	287.6	28.4
40	39.8	03.9	90	89.6	08.8	40	139.3	13.7	90	189.1	18.6	40	238.9	23.5	90	288.6	28.5
41	40.8	04.0	91	90.6	08.9	141	140.3	13.8	191	190.1	18.7	241	239.8	23.6	291	289.6	28.6
42	41.8	04.1	92	91.6	09.0	42	141.3	13.9	92	191.1	18.8	42	240.8	23.7	92	290.6	28.7
43	42.8	04.2	93	92.6	09.1	43	142.3	14.0	93	192.1	18.9	43	241.8	23.8	93	291.6	28.8
44	43.8	04.3	94	93.5	09.2	44	143.3	14.1	94	193.1	19.0	44	242.8	23.9	94	292.6	28.9
45	44.8	04.4	95	94.5	09.3	45	144.3	14.2	95	194.1	19.1	45	243.8	24.0	95	293.6	29.0
46	45.8	04.5	96	95.5	09.4	146	145.3	14.3	196	195.1	19.2	246	244.8	24.1	296	294.6	29.1
47	46.8	04.6	97	96.5	09.5	47	146.3	14.4	97	196.0	19.3	47	245.8	24.2	97	295.6	29.2
48	47.8	04.7	98	97.5	09.6	48	147.3	14.5	98	197.0	19.4	48	246.8	24.3	98	296.6	29.2
49	48.8	04.8	99	98.5	09.7	49	148.3	14.6	99	198.0	19.5	49	247.8	24.4	99	297.6	29.3
50	49.8	04.9	100	99.5	09.8	150	149.3	14.7	200	199.0	19.6	50	248.8	24.5	300	298.6	29.4
Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat	Diff	Dep	Lat

for 7½ Points.

60 Difference of Latitude and Departure for $\frac{3}{4}$ Point

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	01.0	00.1	51	50.4	07.5	101	99.9	14.8	151	149.4	22.1	201	198.8	29.5	251	248.3	36.8
2	02.0	00.3	52	51.4	07.6	02	100.9	15.0	52	150.3	22.3	02	199.8	29.6	52	249.3	37.0
3	03.0	00.4	53	52.4	07.8	03	101.9	15.1	53	151.3	22.4	03	200.8	29.8	53	250.2	37.1
4	04.0	00.6	54	53.4	07.9	04	102.9	15.3	54	152.3	22.6	04	201.8	29.9	54	251.2	37.3
5	04.9	00.7	55	54.4	08.1	05	103.9	15.4	55	153.3	22.7	05	202.8	30.1	55	252.2	37.4
6	05.9	00.9	56	55.4	08.2	106	104.8	15.5	156	154.3	22.9	206	203.8	30.2	256	253.2	37.5
7	06.9	01.0	57	56.4	08.4	07	105.8	15.7	57	155.3	23.0	07	204.7	30.4	57	254.2	37.7
8	07.9	01.2	58	57.4	08.5	08	106.8	15.8	58	156.3	23.2	08	205.7	30.5	58	255.2	37.8
9	08.9	01.3	59	58.4	08.6	09	107.8	16.0	59	157.3	23.3	09	206.7	30.6	59	256.2	38.0
10	09.9	01.5	60	59.3	08.8	10	108.8	16.1	60	158.3	23.5	10	207.7	30.8	60	257.2	38.1
11	10.9	01.6	61	60.3	08.9	111	109.8	16.3	161	159.2	23.6	211	208.7	30.9	261	258.2	38.3
12	11.9	01.8	62	61.3	09.1	12	110.8	16.4	62	160.2	23.8	12	209.7	31.1	62	259.1	38.4
13	12.9	01.9	63	62.3	09.2	13	111.8	16.6	63	161.2	23.9	13	210.7	31.2	63	260.1	38.6
14	13.8	02.1	64	63.3	09.4	14	112.8	16.7	64	162.2	24.0	14	211.7	31.4	64	261.1	38.7
15	14.8	02.2	65	64.3	09.5	15	113.7	16.9	65	163.2	24.2	15	212.7	31.5	65	262.1	38.9
16	15.8	02.3	66	65.3	09.7	116	114.7	17.0	166	164.2	24.3	216	213.7	31.7	266	263.1	39.0
17	16.8	02.5	67	66.3	09.8	17	115.7	17.2	67	165.2	24.5	17	214.6	31.8	67	264.1	39.2
18	17.8	02.6	68	67.3	10.0	18	116.7	17.3	68	166.2	24.6	18	215.6	32.0	68	265.1	39.3
19	18.8	02.8	69	68.2	10.1	19	117.7	17.5	69	167.2	24.8	19	216.6	32.1	69	266.1	39.5
20	19.8	02.9	70	69.2	10.3	20	118.7	17.6	70	168.1	24.9	20	217.6	32.3	70	267.1	39.6
21	20.8	03.1	71	70.2	10.4	121	119.7	17.7	171	169.1	25.1	221	218.6	32.4	271	268.1	39.7
22	21.8	03.2	72	71.2	10.6	22	120.7	17.9	72	170.1	25.2	22	219.6	32.6	72	269.0	39.9
23	22.7	03.4	73	72.2	10.7	23	121.7	18.0	73	171.1	25.4	23	220.6	32.7	73	270.0	40.0
24	23.7	03.5	74	73.2	10.8	24	122.7	18.2	74	172.1	25.5	24	221.6	32.8	74	271.0	40.2
25	24.7	03.7	75	74.2	11.0	25	123.6	18.3	75	173.1	25.7	25	222.6	33.0	75	272.0	40.3
26	25.7	03.8	76	75.2	11.1	126	124.6	18.5	176	174.1	25.8	226	223.5	33.1	276	273.0	40.5
27	26.7	04.0	77	76.2	11.3	27	125.6	18.6	77	175.1	26.0	27	224.5	33.3	77	274.0	40.6
28	27.7	04.1	78	77.1	11.4	28	126.6	18.8	78	176.1	26.1	28	225.5	33.4	78	275.0	40.8
29	28.7	04.3	79	78.1	11.6	29	127.6	18.9	79	177.1	26.3	29	226.5	33.6	79	276.0	40.9
30	29.7	04.4	80	79.1	11.7	30	128.6	19.1	80	178.0	26.4	30	227.5	33.7	80	277.0	41.1
31	30.7	04.5	81	80.1	11.9	131	129.6	19.2	181	179.0	26.5	231	228.5	33.9	281	277.9	41.2
32	31.7	04.7	82	81.1	12.0	32	130.6	19.4	82	180.0	26.7	32	229.5	34.0	82	278.9	41.4
33	32.6	04.8	83	82.1	12.2	33	131.6	19.5	83	181.0	26.8	33	230.5	34.2	83	279.9	41.5
34	33.6	05.0	84	83.1	12.3	34	132.5	19.6	84	182.0	27.0	34	231.5	34.3	84	280.9	41.6
35	34.6	05.1	85	84.1	12.5	35	133.5	19.8	85	183.0	27.1	35	232.4	34.5	85	281.9	41.8
36	35.6	05.3	86	85.1	12.6	136	134.5	19.9	186	184.0	27.3	236	233.4	34.6	286	282.9	41.9
37	36.6	05.4	87	86.1	12.8	37	135.5	20.1	87	185.0	27.4	37	234.4	34.8	87	283.9	42.1
38	37.6	05.6	88	87.0	12.9	38	136.5	20.2	88	186.0	27.6	38	235.4	34.9	88	284.9	42.2
39	38.6	05.7	89	88.0	13.0	39	137.5	20.4	89	186.9	27.7	39	236.4	35.0	89	285.9	42.4
40	39.6	05.9	90	89.0	13.2	40	138.5	20.5	90	187.9	27.9	40	237.4	35.2	90	286.8	42.5
41	40.6	06.0	91	90.0	13.3	141	139.5	20.7	191	188.9	28.0	241	238.4	35.3	291	287.8	42.7
42	41.5	06.2	92	91.0	13.5	42	140.5	20.8	92	189.9	28.2	42	239.4	35.5	92	288.8	42.8
43	42.5	06.3	93	92.0	13.6	43	141.4	21.0	93	190.9	28.3	43	240.4	35.6	93	289.8	43.0
44	43.5	06.5	94	93.0	13.8	44	142.4	21.1	94	191.9	28.5	44	241.3	35.8	94	290.8	43.1
45	44.5	06.6	95	94.0	13.9	45	143.4	21.3	95	192.9	28.6	45	242.3	35.9	95	291.8	43.3
46	45.5	06.7	96	95.0	14.1	146	144.4	21.4	196	193.9	28.7	246	243.3	36.1	296	292.8	43.4
47	46.5	06.9	97	95.9	14.2	47	145.4	21.6	97	194.9	28.9	47	244.3	36.2	97	293.8	43.6
48	47.5	07.0	98	96.9	14.4	48	146.4	21.7	98	195.8	29.0	48	245.3	36.4	98	294.8	43.7
49	48.5	07.2	99	97.9	14.5	49	147.4	21.8	99	196.8	29.2	49	246.3	36.5	99	295.7	43.8
50	49.5	07.3	100	98.9	14.7	150	148.4	22.0	200	197.8	29.3	250	247.3	36.7	300	296.7	44.0
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for $7\frac{1}{4}$ Points

Difference of Latitude and Departure for 1 Point.

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Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	01.0	00.2	51	50.0	10.0	101	99.1	19.7	151	148.1	29.5	201	197.1	39.2	251	246.1	49.0
2	02.0	00.4	52	51.0	10.1	02	100.0	19.9	52	149.1	29.7	02	198.1	39.4	52	247.1	49.2
3	02.9	00.6	53	52.0	10.3	03	101.0	20.1	53	150.0	29.9	03	199.1	39.6	53	248.1	49.4
4	03.9	00.8	54	53.0	10.5	04	102.0	20.3	54	151.0	30.0	04	200.1	39.8	54	249.1	49.6
5	04.9	01.0	55	53.9	10.7	05	103.0	20.5	55	152.0	30.2	05	201.0	40.0	55	250.1	49.8
6	05.9	01.2	56	54.9	10.9	06	104.0	20.7	156	153.0	30.4	206	202.0	40.2	256	251.1	50.0
7	06.9	01.4	57	55.9	11.1	07	104.9	20.9	57	154.0	30.6	07	203.0	40.4	57	252.0	50.1
8	07.8	01.6	58	56.9	11.3	08	105.9	21.1	58	154.9	30.8	08	204.0	40.6	58	253.0	50.3
9	08.8	01.8	59	57.9	11.5	09	106.9	21.3	59	155.9	31.0	09	205.0	40.8	59	254.0	50.5
10	09.8	02.0	60	58.8	11.7	10	107.9	21.5	60	156.9	31.2	10	205.9	41.0	60	255.0	50.7
11	10.8	02.1	61	59.8	11.9	11	108.9	21.7	161	157.9	31.4	211	206.9	41.2	261	256.0	50.9
12	11.8	02.3	62	60.8	12.1	12	109.8	21.9	62	158.9	31.6	12	207.9	41.4	62	256.9	51.1
13	12.7	02.5	63	61.8	12.3	13	110.8	22.0	63	159.8	31.8	13	208.9	41.6	63	257.9	51.3
14	13.7	02.7	64	62.8	12.5	14	111.8	22.2	64	160.8	32.0	14	209.9	41.8	64	258.9	51.5
15	14.7	02.9	65	63.7	12.7	15	112.8	22.4	65	161.8	32.2	15	210.8	42.0	65	259.9	51.7
16	15.7	03.1	66	64.7	12.9	16	113.8	22.6	166	162.8	32.4	216	211.8	42.1	266	260.9	51.9
17	16.7	03.3	67	65.7	13.1	17	114.7	22.8	67	163.8	32.6	17	212.8	42.3	67	261.8	52.1
18	17.7	03.5	68	66.7	13.3	18	115.7	23.0	68	164.7	32.8	18	213.8	42.5	68	262.8	52.3
19	18.6	03.7	69	67.7	13.5	19	116.7	23.2	69	165.7	33.0	19	214.8	42.7	69	263.8	52.5
20	19.6	03.9	70	68.6	13.7	20	117.7	23.4	70	166.7	33.2	20	215.7	42.9	70	264.8	52.7
21	20.6	04.1	71	69.6	13.9	21	118.7	23.6	171	167.7	33.4	221	216.7	43.1	271	265.8	52.9
22	21.6	04.3	72	70.6	14.0	22	119.6	23.8	72	168.7	33.6	22	217.7	43.3	72	266.7	53.1
23	22.6	04.5	73	71.6	14.2	23	120.6	24.0	73	169.7	33.8	23	218.7	43.5	73	267.7	53.3
24	23.5	04.7	74	72.6	14.4	24	121.6	24.2	74	170.6	34.0	24	219.7	43.7	74	268.7	53.5
25	24.5	04.9	75	73.6	14.6	25	122.6	24.4	75	171.6	34.1	25	220.6	43.9	75	269.7	53.7
26	25.5	05.1	76	74.5	14.8	26	123.6	24.6	176	172.6	34.3	226	221.6	44.1	276	270.7	53.9
27	26.5	05.3	77	75.5	15.0	27	124.5	24.8	77	173.6	34.5	27	222.6	44.3	77	271.6	54.0
28	27.5	05.5	78	76.5	15.2	28	125.5	25.0	78	174.6	34.7	28	223.6	44.5	78	272.6	54.2
29	28.4	05.7	79	77.5	15.4	29	126.5	25.2	79	175.5	34.9	29	224.6	44.7	79	273.6	54.4
30	29.4	05.9	80	78.5	15.6	30	127.5	25.4	80	176.5	35.1	30	225.6	44.9	80	274.6	54.6
31	30.4	06.0	81	79.4	15.8	31	128.5	25.6	181	177.5	35.3	231	226.5	45.1	281	275.6	54.8
32	31.4	06.2	82	80.4	16.0	32	129.5	25.8	82	178.5	35.5	32	227.5	45.3	82	276.5	55.0
33	32.4	06.4	83	81.4	16.2	33	130.4	26.0	83	179.5	35.7	33	228.5	45.5	83	277.5	55.2
34	33.3	06.6	84	82.4	16.4	34	131.4	26.1	84	180.4	35.9	34	229.5	45.7	84	278.5	55.4
35	34.3	06.8	85	83.4	16.6	35	132.4	26.3	85	181.4	36.1	35	230.5	45.9	85	279.5	55.6
36	35.3	07.0	86	84.3	16.8	36	133.4	26.5	186	182.4	36.3	236	231.4	46.0	286	280.5	55.8
37	36.3	07.2	87	85.3	17.0	37	134.4	26.7	87	183.4	36.5	37	232.4	46.2	87	281.5	56.0
38	37.3	07.4	88	86.3	17.2	38	135.3	26.9	88	184.4	36.7	38	233.4	46.4	88	282.4	56.2
39	38.2	07.6	89	87.3	17.4	39	136.3	27.1	89	185.3	36.9	39	234.4	46.6	89	283.4	56.4
40	39.2	07.8	90	88.3	17.6	40	137.3	27.3	90	186.3	37.1	40	235.4	46.8	90	284.4	56.6
41	40.2	08.0	91	89.2	17.8	41	138.3	27.5	191	187.3	37.3	241	236.3	47.0	291	285.4	56.8
42	41.2	08.2	92	90.2	18.0	42	139.3	27.7	92	188.3	37.5	42	237.3	47.2	92	286.4	57.0
43	42.2	08.4	93	91.2	18.1	43	140.2	27.9	93	189.3	37.7	43	238.3	47.4	93	287.3	57.2
44	43.2	08.6	94	92.2	18.3	44	141.2	28.1	94	190.2	37.9	44	239.3	47.6	94	288.3	57.4
45	44.1	08.8	95	93.2	18.5	45	142.2	28.3	95	191.2	38.0	45	240.3	47.8	95	289.3	57.6
46	45.1	09.0	96	94.1	18.7	46	143.2	28.5	196	192.2	38.2	246	241.2	48.0	296	290.3	57.8
47	46.1	09.2	97	95.1	18.9	47	144.2	28.7	97	193.2	38.4	47	242.2	48.2	97	291.3	58.0
48	47.1	09.4	98	96.1	19.1	48	145.1	28.9	98	194.2	38.6	48	243.2	48.4	98	292.2	58.1
49	48.1	09.6	99	97.1	19.3	49	146.1	29.1	99	195.2	38.8	49	244.2	48.6	99	293.2	58.3
50	49.0	09.8	100	98.1	19.5	50	147.1	29.3	200	196.1	39.0	250	245.2	48.8	300	294.2	58.5
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 7 Points.

62 Difference of Latitude and Departure for $1\frac{1}{4}$ Points.

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	01.0	00.2	51	49.5	12.4	101	98.0	24.5	151	146.5	36.7	201	195.0	48.8	251	243.5	61.0
2	01.9	00.5	52	50.4	12.6	02	98.9	24.8	52	147.4	36.9	02	195.9	49.1	52	244.4	61.2
3	02.9	00.7	53	51.4	12.9	03	99.9	25.0	53	148.4	37.2	03	196.9	49.3	53	245.4	61.5
4	03.9	01.0	54	52.4	13.1	04	100.9	25.3	54	149.4	37.4	04	197.9	49.6	54	246.4	61.7
5	04.9	01.2	55	53.4	13.4	05	101.9	25.5	55	150.4	37.7	05	198.9	49.8	55	247.4	62.0
6	05.8	01.5	56	54.3	13.6	106	102.8	25.8	156	151.3	37.9	206	199.8	50.1	256	248.3	62.2
7	06.8	01.7	57	55.3	13.9	07	103.8	26.0	57	152.3	38.2	07	200.8	50.3	57	249.3	62.5
8	07.8	01.9	58	56.3	14.1	08	104.8	26.2	58	153.3	38.4	08	201.8	50.5	58	250.3	62.7
9	08.7	02.2	59	57.2	14.3	09	105.7	26.5	59	154.2	38.6	09	202.7	50.8	59	251.2	62.9
10	09.7	02.4	60	58.2	14.6	10	106.7	26.7	60	155.2	38.9	10	203.7	51.0	60	252.2	63.2
11	10.7	02.7	61	59.2	14.8	111	107.7	27.0	161	156.2	39.1	211	204.7	51.3	261	253.2	63.4
12	11.6	02.9	62	60.1	15.1	12	108.6	27.2	62	157.1	39.4	12	205.6	51.5	62	254.1	63.7
13	12.6	03.2	63	61.1	15.3	13	109.6	27.5	63	158.1	39.6	13	206.6	51.8	63	255.1	63.9
14	13.6	03.4	64	62.1	15.6	14	110.6	27.7	64	159.1	39.9	14	207.6	52.0	64	256.1	64.2
15	14.6	03.6	65	63.1	15.8	15	111.6	27.9	65	160.1	40.1	15	208.6	52.2	65	257.1	64.4
16	15.5	03.9	66	64.0	16.0	116	112.5	28.2	166	161.0	40.3	216	209.5	52.5	266	258.0	64.6
17	16.5	04.1	67	65.0	16.3	17	113.5	28.4	67	162.0	40.6	17	210.5	52.7	67	259.0	64.9
18	17.5	04.4	68	66.0	16.5	18	114.5	28.7	68	163.0	40.8	18	211.5	53.0	68	260.0	65.1
19	18.4	04.6	69	66.9	16.8	19	115.4	28.9	69	163.9	41.1	19	212.4	53.2	69	260.9	65.4
20	19.4	04.9	70	67.0	17.0	20	116.4	29.2	70	164.9	41.3	20	213.4	53.5	70	261.9	65.6
21	20.4	05.1	71	68.9	17.3	21	117.4	29.4	71	165.9	41.6	21	214.4	53.7	71	262.9	65.9
22	21.3	05.3	72	69.8	17.5	22	118.3	29.6	72	166.8	41.8	22	215.3	53.9	72	263.8	66.1
23	22.3	05.6	73	70.8	17.7	23	119.3	29.9	73	167.8	42.0	23	216.3	54.2	73	264.8	66.3
24	23.3	05.8	74	71.8	18.0	24	120.3	30.1	74	168.8	42.3	24	217.3	54.4	74	265.8	66.6
25	24.3	06.1	75	72.8	18.2	25	121.3	30.4	75	169.8	42.5	25	218.3	54.7	75	266.8	66.8
26	25.2	06.3	76	73.7	18.5	26	122.2	30.6	76	170.7	42.8	26	219.2	54.9	76	267.7	67.1
27	26.2	06.6	77	74.7	18.7	27	123.2	30.9	77	171.7	43.0	27	220.2	55.2	77	268.7	67.3
28	27.2	06.8	78	75.7	19.0	28	124.2	31.1	78	172.7	43.3	28	221.2	55.4	78	269.7	67.6
29	28.1	07.0	79	76.6	19.2	29	125.1	31.3	79	173.6	43.5	29	222.1	55.6	79	270.6	67.8
30	29.1	07.3	80	77.6	19.4	30	126.1	31.6	80	174.6	43.7	30	223.1	55.9	80	271.6	68.0
31	30.1	07.5	81	78.6	19.7	31	127.1	31.8	81	175.6	44.0	31	224.1	56.1	81	272.6	68.3
32	31.0	07.8	82	79.5	19.9	32	128.0	32.1	82	176.5	44.2	32	225.0	56.4	82	273.5	68.5
33	32.0	08.0	83	80.5	20.2	33	129.0	32.3	83	177.5	44.5	33	226.0	56.6	83	274.5	68.8
34	33.0	08.3	84	81.5	20.4	34	130.0	32.6	84	178.5	44.7	34	227.0	56.9	84	275.5	69.0
35	34.0	08.5	85	82.5	20.7	35	131.0	32.8	85	179.5	45.0	35	228.0	57.1	85	276.5	69.3
36	34.9	08.7	86	83.4	20.9	36	131.9	33.0	86	180.4	45.2	36	228.9	57.3	86	277.4	69.5
37	35.9	09.0	87	84.4	21.1	37	132.9	33.3	87	181.4	45.4	37	229.9	57.6	87	278.4	69.7
38	36.9	09.2	88	85.4	21.4	38	133.9	33.5	88	182.4	45.7	38	230.9	57.8	88	279.4	70.0
39	37.8	09.5	89	86.3	21.6	39	134.8	33.8	89	183.3	45.9	39	231.8	58.1	89	280.3	70.2
40	38.8	09.7	90	87.3	21.9	40	135.8	34.0	90	184.3	46.2	40	232.8	58.3	90	281.3	70.5
41	39.8	10.0	91	88.3	22.1	41	136.8	34.3	91	185.3	46.4	41	233.8	58.6	91	282.3	70.7
42	40.7	10.2	92	89.2	22.4	42	137.7	34.5	92	186.2	46.7	42	234.7	58.8	92	283.2	71.0
43	41.7	10.4	93	90.2	22.6	43	138.7	34.7	93	187.2	46.9	43	235.7	59.0	93	284.2	71.2
44	42.7	10.7	94	91.2	22.8	44	139.7	35.0	94	188.2	47.1	44	236.7	59.3	94	285.2	71.4
45	43.7	10.9	95	92.2	23.1	45	140.7	35.2	95	189.2	47.4	45	237.7	59.5	95	286.2	71.7
46	44.6	11.2	96	93.1	23.3	46	141.6	35.5	96	190.1	47.6	46	238.6	59.8	96	287.1	71.9
47	45.6	11.4	97	94.1	23.6	47	142.6	35.7	97	191.1	47.9	47	239.6	60.0	97	288.1	72.2
48	46.6	11.7	98	95.1	23.8	48	143.6	36.0	98	192.1	48.1	48	240.6	60.3	98	289.1	72.4
49	47.5	11.9	99	96.0	24.1	49	144.5	36.2	99	193.0	48.4	49	241.5	60.5	99	290.0	72.7
50	48.5	12.2	100	97.0	24.3	50	145.5	36.5	100	194.0	48.6	50	242.5	60.7	100	291.0	72.9
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for $6\frac{1}{4}$ Points.

Difference of Latitude and Departure for $1\frac{1}{2}$ Points 63

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.3	51	48.8	14.8	101	96.-	29.3	151	144.5	43.8	201	192.4	58.3	251	240.2	72.8
2	01.9	00.6	52	49.8	15.1	02	97.6	29.6	52	145.5	44.1	02	193.3	58.6	52	241.2	73.1
3	02.9	00.9	53	50.7	15.4	03	98.6	29.9	53	146.4	44.4	03	194.3	58.9	53	242.1	73.4
4	03.8	01.2	54	51.7	15.7	04	99.5	30.2	54	147.4	44.7	04	195.2	59.2	54	243.1	73.7
5	04.8	01.5	55	52.6	16.0	05	100.5	30.5	55	148.3	45.0	05	196.2	59.5	55	244.0	74.0
6	05.7	01.7	56	53.6	16.2	106	101.4	30.7	156	149.3	45.2	206	197.1	59.7	256	245.0	74.2
7	06.7	02.0	57	54.5	16.5	07	102.4	31.0	57	150.2	45.5	07	198.1	60.0	57	245.9	74.5
8	07.7	02.3	58	55.5	16.8	08	103.4	31.3	58	151.2	45.8	08	199.1	60.3	58	246.9	74.8
9	08.6	02.6	59	56.5	17.1	09	104.3	31.6	59	152.2	46.1	09	200.0	60.6	59	247.9	75.1
10	09.6	02.9	60	57.4	17.4	10	105.3	31.9	60	153.1	46.4	10	201.0	60.9	60	248.8	75.4
11	10.5	03.2	61	58.4	17.7	111	106.2	32.2	161	154.1	46.7	211	201.9	61.2	261	249.8	75.7
12	11.5	03.5	62	59.3	18.0	12	107.2	32.5	62	155.0	47.0	12	202.9	61.5	62	250.7	76.0
13	12.4	03.8	63	60.3	18.3	13	108.1	32.8	63	156.0	47.3	13	203.8	61.8	63	251.7	76.3
14	13.4	04.1	64	61.2	18.6	14	109.1	33.1	64	156.9	47.6	14	204.8	62.1	64	252.6	76.6
15	14.4	04.4	65	62.2	18.9	15	110.1	33.4	65	157.9	47.9	15	205.8	62.4	65	253.6	76.9
16	15.3	04.6	66	63.2	19.1	116	111.0	33.6	166	158.9	48.1	216	206.7	62.6	266	254.6	77.1
17	15.6	04.9	67	64.1	19.4	17	112.0	33.9	67	159.8	48.4	17	207.7	62.9	67	255.5	77.4
18	16.7	05.2	68	65.1	19.7	18	112.9	34.2	68	160.8	48.7	18	208.6	63.2	68	256.5	77.7
19	17.8	05.5	69	66.0	20.0	19	113.9	34.5	69	161.7	49.0	19	209.6	63.5	69	257.4	78.0
20	19.1	05.8	70	67.0	20.3	20	114.8	34.8	70	162.7	49.3	20	210.5	63.8	70	258.4	78.3
21	20.1	06.1	71	67.9	20.6	121	115.8	35.1	171	163.6	49.6	221	211.5	64.1	271	259.3	78.6
22	21.1	06.4	72	68.9	20.9	22	116.8	35.4	72	164.6	49.9	22	212.5	64.4	72	260.3	78.9
23	22.0	06.7	73	69.9	21.2	23	117.7	35.7	73	165.6	50.2	23	213.4	64.7	73	261.3	79.2
24	23.0	07.0	74	70.8	21.5	24	118.7	36.0	74	166.5	50.5	24	214.4	65.0	74	262.2	79.5
25	23.9	07.3	75	71.8	21.8	25	119.6	36.3	75	167.5	50.8	25	215.3	65.3	75	263.2	79.8
26	24.9	07.5	76	72.7	22.0	126	120.6	36.5	176	168.4	51.0	226	216.3	65.5	276	264.1	80.0
27	25.8	07.8	77	73.7	22.3	27	121.5	36.8	77	169.4	51.3	27	217.2	65.8	77	265.1	80.3
28	26.8	08.1	78	74.6	22.6	28	122.5	37.1	78	170.3	51.6	28	218.2	66.1	78	266.0	80.6
29	27.8	08.4	79	75.6	22.9	29	123.5	37.4	79	171.3	51.9	29	219.2	66.4	79	267.0	80.9
30	28.7	08.7	80	76.6	23.2	30	124.4	37.7	80	172.3	52.2	30	220.1	66.7	80	268.0	81.2
31	29.7	09.0	81	77.5	23.5	131	125.4	38.0	181	173.2	52.5	231	221.1	67.0	281	268.9	81.5
32	30.6	09.3	82	78.5	23.8	32	126.3	38.3	82	174.2	52.8	32	222.0	67.3	82	269.9	81.8
33	31.6	09.6	83	79.4	24.1	33	127.3	38.6	83	175.1	53.1	33	223.0	67.6	83	270.8	82.1
34	32.5	09.9	84	80.4	24.4	34	128.2	38.9	84	176.1	53.4	34	223.9	67.9	84	271.8	82.4
35	33.5	10.2	85	81.3	24.7	35	129.2	39.2	85	177.0	53.7	35	224.9	68.2	85	272.7	82.7
36	34.5	10.4	86	82.3	24.9	136	130.2	39.4	186	178.0	53.9	236	225.9	68.4	286	273.7	82.9
37	35.4	10.7	87	83.3	25.2	37	131.1	39.7	87	179.0	54.2	37	226.8	68.7	87	274.7	83.2
38	36.4	11.0	88	84.2	25.5	38	132.1	40.0	88	179.9	54.5	38	227.8	69.0	88	275.6	83.5
39	37.3	11.3	89	85.2	25.8	39	133.0	40.3	89	180.9	54.8	39	228.7	69.3	89	276.6	83.8
40	38.3	11.6	90	86.1	26.1	40	134.0	40.6	90	181.8	55.1	40	229.7	69.6	90	277.5	84.1
41	39.2	11.9	91	87.1	26.4	141	134.9	40.9	191	182.8	55.4	241	230.6	69.9	291	278.5	84.4
42	40.2	12.2	92	88.0	26.7	42	135.9	41.2	92	183.7	55.7	42	231.6	70.2	92	279.4	84.7
43	41.2	12.5	93	89.0	27.0	43	136.9	41.5	93	184.7	56.0	43	232.5	70.5	93	280.4	85.0
44	42.1	12.8	94	90.0	27.3	44	137.8	41.8	94	185.7	56.3	44	233.5	70.8	94	281.4	85.3
45	43.1	13.1	95	90.9	27.6	45	138.8	42.1	95	186.6	56.6	45	234.5	71.1	95	282.3	85.6
46	44.0	13.3	96	91.9	27.8	146	139.7	42.3	196	187.6	56.8	246	235.4	71.3	296	283.3	85.8
47	45.0	13.6	97	92.8	28.1	47	140.7	42.6	97	188.5	57.1	47	236.4	71.6	97	284.2	86.1
48	45.9	13.9	98	93.8	28.4	48	141.6	42.9	98	189.5	57.4	48	237.3	71.9	98	285.2	86.4
49	46.9	14.2	99	94.7	28.7	49	142.6	43.2	99	190.4	57.7	49	238.3	72.2	99	286.1	86.7
50	47.9	14.5	100	95.7	29.0	150	143.5	43.5	200	191.4	58.0	250	239.2	72.5	300	287.1	87.0
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for $6\frac{1}{2}$ Points.

64 Difference of Latitude and Departure for $1\frac{1}{4}$ Points

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	00.9	00.3	51	48.0	17.2	101	95.1	34.0	151	142.2	50.9	201	189.2	67.7	251	236.3	84.5
2	01.6	00.7	52	49.0	17.5	02	96.0	34.4	52	143	51.2	02	190.2	68.0	52	237.3	84.9
3	02.8	01.0	53	49.9	17.9	03	97.0	34.7	53	144.0	51.5	03	191.1	68.4	53	238.2	85.2
4	03.8	01.3	54	50.8	18.2	04	97.9	35.0	54	145.0	51.9	04	192.1	68.7	54	239.2	85.5
5	04.7	01.7	55	51.8	18.5	05	98.0	35.4	55	145.9	52.2	05	193.0	69.0	55	240.1	85.9
6	05.6	02.0	56	52.7	18.9	106	99.8	55.7	156	146.9	52.5	206	194.0	69.4	256	241.0	86.2
7	06.6	02.4	57	53.7	19.2	07	100.7	36.0	57	147.8	52.9	07	194.9	69.7	57	242.0	86.6
8	07.5	02.7	58	54.6	19.5	08	101.7	36.4	58	148.8	53.2	08	195.8	70.1	58	242.9	86.9
9	08.5	03.0	59	55.5	19.9	09	102.6	36.7	59	149.7	53.6	09	196.8	70.4	59	243.8	87.2
10	09.4	03.4	60	56.5	20.2	10	103.6	37.0	60	150.6	53.9	10	197.7	70.7	60	244.8	87.6
11	10.4	03.7	61	57.4	20.5	111	104.5	37.4	161	151.6	54.2	211	198.7	71.1	261	245.7	87.9
12	11.3	04.0	62	58.4	20.9	12	105.4	37.7	62	152.5	54.6	12	199.6	71.4	62	246.7	88.2
13	12.2	04.4	63	59.3	21.2	13	106.4	38.1	63	153.5	54.9	13	200.5	71.7	63	247.6	88.6
14	13.2	04.7	64	60.3	21.6	14	107.3	38.4	64	154.4	55.2	14	201.5	72.1	64	248.6	88.9
15	14.1	05.1	65	61.2	21.9	15	108.3	38.7	65	155.3	55.6	15	202.4	72.4	65	249.5	89.2
16	15.1	05.4	66	62.1	22.2	116	109.2	39.1	166	156.3	55.9	216	203.4	72.7	266	250.4	89.6
17	16.0	05.7	67	63.1	22.6	17	110.2	39.4	67	157.2	56.2	17	204.3	73.1	67	251.4	89.9
18	17.0	06.1	68	64.0	22.9	18	111.1	39.7	68	158.2	56.6	18	205.2	73.4	68	252.3	90.3
19	17.9	06.4	69	65.0	23.2	19	112.0	40.1	69	159.1	56.9	19	206.2	73.8	69	253.3	90.6
20	18.8	06.7	70	65.9	23.6	20	113.0	40.4	70	160.1	57.3	20	207.1	74.1	70	254.2	90.9
21	19.8	07.1	71	66.8	23.9	121	113.9	40.8	171	161.0	57.6	221	208.1	74.4	271	255.1	91.3
22	20.7	07.4	72	67.8	24.2	22	114.0	41.1	72	161.9	57.9	22	209.0	74.8	72	256.1	91.6
23	21.7	07.7	73	68.7	24.6	23	115.8	41.4	73	162.9	58.3	23	210.0	75.1	73	257.0	91.9
24	22.6	08.1	74	69.7	24.9	24	116.7	41.8	74	163.8	58.6	24	210.9	75.4	74	258.0	92.3
25	23.5	08.4	75	70.6	25.3	25	117.7	42.1	75	164.8	58.9	25	211.8	75.8	75	258.9	92.6
26	24.5	08.8	76	71.6	25.6	126	118.6	42.4	176	165.7	59.3	226	212.8	76.1	276	259.9	93.0
27	25.4	09.1	77	72.5	25.9	27	119.6	42.8	77	166.6	59.6	27	213.7	76.5	77	260.8	93.3
28	26.4	09.4	78	73.4	26.3	28	120.5	43.1	78	167.6	60.0	28	214.7	76.8	78	261.7	93.6
29	27.3	09.8	79	74.4	26.6	29	121.5	43.4	79	168.5	60.3	29	215.6	77.1	79	262.7	94.0
30	28.2	10.1	80	75.3	26.9	30	122.4	43.8	80	169.5	60.6	30	216.5	77.5	80	263.6	94.3
31	29.2	10.4	81	76.3	27.3	131	123.3	44.1	181	170.4	61.0	231	217.5	77.8	281	264.6	94.6
32	30.1	10.8	82	77.2	27.6	32	124.3	44.5	82	171.4	61.3	32	218.4	78.1	82	265.5	95.0
33	31.1	11.1	83	78.1	28.0	33	125.2	44.8	83	172.3	61.6	33	219.4	78.5	83	266.4	95.3
34	32.0	11.5	84	79.1	28.3	34	126.2	45.1	84	173.2	62.0	34	220.3	78.8	84	267.4	95.6
35	33.0	11.8	85	80.0	28.6	35	127.1	45.5	85	174.2	62.3	35	221.3	79.1	85	268.3	96.0
36	33.9	12.1	86	81.0	29.0	136	128.0	45.8	186	175.1	62.6	236	222.2	79.5	286	269.3	96.3
37	34.8	12.5	87	81.9	29.3	37	129.0	46.1	87	176.1	63.0	37	223.1	79.8	87	270.2	96.7
38	35.8	12.8	88	82.9	29.6	38	129.9	46.5	88	177.0	63.3	38	224.1	80.2	88	271.2	97.0
39	36.7	13.1	89	83.8	30.0	39	130.9	46.8	89	177.9	63.7	39	225.0	80.5	89	272.1	97.3
40	37.7	13.5	90	84.7	30.3	40	131.8	47.2	90	178.9	64.0	40	226.0	80.8	90	273.0	97.7
41	38.6	13.8	91	85.7	30.6	141	132.8	47.5	191	179.8	64.3	241	226.9	81.2	291	274.0	98.0
42	39.5	14.1	92	86.6	31.0	42	133.7	47.8	92	180.8	64.7	42	227.8	81.5	92	274.9	98.3
43	40.5	14.5	93	87.6	31.3	43	134.6	48.2	93	181.7	65.0	43	228.8	81.8	93	275.9	98.7
44	41.4	14.8	94	88.5	31.7	44	135.6	48.5	94	182.6	65.3	44	229.7	82.2	94	276.8	99.0
45	42.4	15.2	95	89.4	32.0	45	136.5	48.8	95	183.6	65.7	45	230.7	82.5	95	277.7	99.4
46	43.3	15.5	96	90.4	32.3	146	137.5	49.2	196	184.5	66.0	246	231.6	82.9	296	278.7	99.7
47	44.3	15.8	97	91.3	32.7	47	138.4	49.5	97	185.5	66.3	47	232.5	83.2	97	279.6	100.0
48	45.2	16.2	98	92.3	33.0	48	139.3	49.8	98	186.4	66.7	48	233.5	83.5	98	280.6	100.4
49	46.1	16.5	99	93.2	33.3	49	140.3	50.2	99	187.4	67.0	49	234.4	83.9	99	281.5	100.7
50	47.1	16.8	100	94.2	33.7	150	141.2	50.5	200	188.3	67.4	250	235.4	84.2	300	282.5	101.0
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for $6\frac{1}{4}$ Points.

Difference of Latitude and Departure for 2 Points 65

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.9	00.4	51	47.1	19.5	101	93.3	38.7	151	139.5	57.8	201	185.7	76.9	251	231.9	96.1
2	01.8	00.8	52	48.0	19.9	02	94.2	39.0	52	140.4	58.2	02	186.6	77.3	52	232.8	96.4
3	02.8	01.1	53	49.0	20.3	03	95.2	39.4	53	141.4	58.6	03	187.6	77.7	53	233.8	96.8
4	03.7	01.5	54	49.9	20.7	04	96.1	39.8	54	142.3	58.9	04	188.5	78.1	54	234.7	97.2
5	04.6	01.9	55	50.8	21.0	05	97.0	40.2	55	143.2	59.3	05	189.4	78.5	55	235.6	97.6
6	05.5	02.3	56	51.7	21.4	06	97.9	40.6	56	144.1	59.7	06	190.3	78.8	56	236.5	98.0
7	06.5	02.7	57	52.7	21.8	07	98.9	41.0	57	145.1	60.1	07	191.3	79.2	57	237.5	98.4
8	07.4	03.1	58	53.6	22.2	08	99.8	41.3	58	146.0	60.5	08	192.2	79.6	58	238.4	98.7
9	08.3	03.4	59	54.5	22.6	09	100.7	41.7	59	146.9	60.9	09	193.1	80.0	59	239.3	99.1
10	09.2	03.8	60	55.4	23.0	10	101.6	42.1	60	147.8	61.2	10	194.0	80.4	60	240.2	99.5
11	10.2	04.2	61	56.4	23.3	11	102.6	42.5	61	148.8	61.6	11	194.9	80.8	61	241.1	99.9
12	11.1	04.6	62	57.3	23.7	12	103.5	42.9	62	149.7	62.0	12	195.9	81.1	62	242.1	100.3
13	12.0	05.0	63	58.2	24.1	13	104.4	43.2	63	150.6	62.4	13	196.8	81.5	63	243.0	100.7
14	12.9	05.4	64	59.1	24.5	14	105.3	43.6	64	151.5	62.8	14	197.7	81.9	64	243.9	101.0
15	13.9	05.7	65	60.1	24.9	15	106.3	44.0	65	152.5	63.1	15	198.6	82.3	65	244.8	101.4
16	14.8	06.1	66	61.0	25.3	16	107.2	44.4	66	153.4	63.5	16	199.6	82.7	66	245.8	101.8
17	15.7	06.5	67	61.9	25.6	17	108.1	44.8	67	154.3	63.9	17	200.5	83.0	67	246.7	102.2
18	16.6	06.9	68	62.8	26.0	18	109.0	45.2	68	155.2	64.3	18	201.4	83.4	68	247.6	102.6
19	17.6	07.3	69	63.8	26.4	19	109.9	45.5	69	156.1	64.7	19	202.3	83.8	69	248.5	103.0
20	18.5	07.7	70	64.7	26.8	20	110.9	45.9	70	157.1	65.1	20	203.3	84.2	70	249.5	103.3
21	19.4	08.0	71	65.6	27.2	21	111.8	46.3	71	158.0	65.4	21	204.2	84.6	71	250.4	103.7
22	20.3	08.4	72	66.5	27.6	22	112.7	46.7	72	158.9	65.8	22	205.1	85.0	72	251.3	104.1
23	21.3	08.8	73	67.5	27.9	23	113.6	47.1	73	159.8	66.2	23	206.0	85.3	73	252.2	104.5
24	22.2	09.2	74	68.4	28.3	24	114.6	47.5	74	160.8	66.6	24	207.0	85.7	74	253.2	104.9
25	23.1	09.6	75	69.3	28.7	25	115.5	47.8	75	161.7	67.0	25	207.9	86.1	75	254.1	105.2
26	24.0	10.0	76	70.2	29.1	26	116.4	48.2	76	162.6	67.4	26	208.8	86.5	76	255.0	105.6
27	24.9	10.3	77	71.1	29.5	27	117.3	48.6	77	163.5	67.7	27	209.7	86.9	77	255.9	106.0
28	25.9	10.7	78	72.1	29.9	28	118.3	49.0	78	164.5	68.1	28	210.7	87.3	78	256.9	106.4
29	26.8	11.1	79	73.0	30.2	29	119.2	49.4	79	165.4	68.5	29	211.6	87.6	79	257.8	106.8
30	27.7	11.5	80	73.9	30.6	30	120.1	49.8	80	166.3	68.9	30	212.5	88.0	80	258.7	107.2
31	28.6	11.9	81	74.8	31.0	31	121.0	50.1	81	167.2	69.3	31	213.4	88.4	81	259.6	107.5
32	29.6	12.2	82	75.8	31.4	32	122.0	50.5	82	168.2	69.7	32	214.4	88.8	82	260.6	107.9
33	30.5	12.6	83	76.7	31.8	33	122.9	50.9	83	169.1	70.0	33	215.3	89.2	83	261.5	108.3
34	31.4	13.0	84	77.6	32.1	34	123.8	51.3	84	170.0	70.4	34	216.2	89.6	84	262.4	108.7
35	32.3	13.4	85	78.5	32.5	35	124.7	51.7	85	170.9	70.8	35	217.1	89.9	85	263.3	109.1
36	33.3	13.8	86	79.5	32.9	36	125.7	52.0	86	171.9	71.2	36	218.0	90.3	86	264.2	109.5
37	34.2	14.2	87	80.4	33.3	37	126.6	52.4	87	172.8	71.6	37	219.0	90.7	87	265.2	109.8
38	35.1	14.5	88	81.3	33.7	38	127.5	52.8	88	173.7	72.0	38	219.9	91.1	88	266.1	110.2
39	36.0	14.9	89	81.2	34.1	39	128.4	53.2	89	174.6	72.3	39	220.8	91.5	89	267.0	110.6
40	37.0	15.3	90	83.2	34.4	40	129.4	53.6	90	175.6	72.7	40	221.7	91.9	90	267.9	111.0
41	37.9	15.7	91	84.1	34.8	41	130.3	54.0	91	176.5	73.1	41	222.7	92.2	91	268.9	111.4
42	38.8	16.1	92	85.0	35.2	42	131.2	54.3	92	177.4	73.5	42	223.6	92.6	92	269.8	111.8
43	39.7	16.5	93	85.9	35.6	43	132.1	54.7	93	178.3	73.9	43	224.5	93.0	93	270.7	112.1
44	40.7	16.8	94	86.9	36.0	44	133.0	55.1	94	179.2	74.2	44	225.4	93.4	94	271.6	112.5
45	41.6	17.2	95	87.8	36.4	45	134.0	55.5	95	180.2	74.6	45	226.4	93.8	95	272.6	112.9
46	42.5	17.6	96	88.7	36.7	46	134.9	55.9	96	181.1	75.0	46	227.3	94.1	96	273.5	113.3
47	43.4	18.0	97	89.6	37.1	47	135.8	56.3	97	182.0	75.4	47	228.2	94.5	97	274.4	113.7
48	44.4	18.4	98	90.6	37.5	48	136.7	56.6	98	182.9	75.8	48	229.1	94.9	98	275.3	114.0
49	45.3	18.8	99	91.5	37.9	49	137.7	57.0	99	183.9	76.2	49	230.1	95.3	99	276.3	114.4
50	46.2	19.1	100	92.4	38.3	50	138.6	57.4	100	184.8	76.5	50	231.0	95.7	100	277.2	114.8

for 6 Points

15
4.2. 10

19

43.10

57
44.15

66 Difference of Latitude and Departure for 2¼ Points

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.9	00.4	51	46.1	21.8	101	91.3	43.2	151	136.5	64.6	201	181.7	85.9	251	226.9	107.3
2	01.8	00.9	52	47.0	22.2	02	92.2	43.6	52	137.4	65.0	02	182.6	86.4	52	227.8	107.8
3	02.7	01.3	53	47.9	22.7	03	93.1	44.0	53	138.3	65.4	03	183.5	86.8	53	228.7	108.2
4	03.6	01.7	54	48.8	23.1	04	94.0	44.5	54	139.2	65.8	04	184.4	87.2	54	229.6	108.6
5	04.5	02.1	55	49.7	23.5	05	94.9	44.9	55	140.1	66.3	05	185.3	87.7	55	230.5	109.0
6	05.4	02.6	56	50.6	23.9	106	95.8	45.3	156	141.0	66.7	206	186.2	88.1	256	231.4	109.5
7	06.3	03.0	57	51.5	24.4	07	96.7	45.8	57	141.9	67.1	07	187.1	88.5	57	232.3	109.9
8	07.2	03.4	58	52.4	24.8	08	97.6	46.2	58	142.8	67.6	08	188.0	88.9	58	233.2	110.3
9	08.1	03.8	59	53.3	25.2	09	98.5	46.6	59	143.7	68.0	09	188.9	89.4	59	234.1	110.7
10	09.0	04.1	60	54.2	25.7	10	99.4	47.0	60	144.6	68.4	10	189.8	89.8	60	235.0	111.2
11	09.9	04.7	61	55.1	26.1	111	100.3	47.5	161	145.5	68.8	211	190.7	90.2	261	235.9	111.6
12	10.8	05.1	62	56.0	26.5	12	101.2	47.9	62	146.4	69.3	12	191.6	90.6	62	236.8	112.0
13	11.8	05.6	63	57.0	26.9	13	102.1	48.3	63	147.3	69.7	13	192.5	91.1	63	237.7	112.5
14	12.7	06.0	64	57.9	27.4	14	103.0	48.7	64	148.2	70.1	14	193.4	91.5	64	238.6	112.9
15	13.6	06.4	65	58.8	27.8	15	103.9	49.2	65	149.1	70.6	15	194.3	91.9	65	239.5	113.3
16	14.5	06.8	66	59.7	28.2	116	104.8	49.6	166	150.0	71.0	216	195.2	92.4	266	240.4	113.7
17	15.4	07.3	67	60.6	28.6	17	105.8	50.0	67	151.0	71.4	17	196.1	92.8	67	241.3	114.2
18	16.3	07.7	68	61.5	29.1	18	106.7	50.5	68	151.9	71.8	18	197.0	93.2	68	242.2	114.6
19	17.2	08.1	69	62.4	29.5	19	107.6	50.9	69	152.8	72.3	19	197.9	93.6	69	243.1	115.0
20	18.1	08.6	70	63.3	29.9	20	108.5	51.3	70	153.7	72.7	20	198.8	94.1	70	244.0	115.5
21	19.0	09.0	71	64.2	30.4	121	109.4	51.7	171	154.6	73.1	221	199.8	94.5	271	245.0	115.9
22	19.9	09.4	72	65.1	30.8	22	110.3	52.2	72	155.5	73.5	22	200.7	94.9	72	245.9	116.3
23	20.8	09.8	73	66.0	31.2	23	111.2	52.6	73	156.4	74.0	23	201.6	95.4	73	246.8	116.7
24	21.7	10.3	74	66.9	31.6	24	112.1	53.0	74	157.3	74.4	24	202.5	95.8	74	247.7	117.2
25	22.6	10.7	75	67.8	32.1	25	113.0	53.5	75	158.2	74.8	25	203.4	96.2	75	248.6	117.6
26	23.5	11.1	76	68.7	32.5	126	113.9	53.9	176	159.1	75.3	226	204.3	96.6	276	249.5	118.0
27	24.4	11.5	77	69.6	32.9	27	114.8	54.3	77	160.0	75.7	27	205.2	97.1	77	250.4	118.4
28	25.3	12.0	78	70.5	33.4	28	115.7	54.7	78	160.9	76.1	28	206.1	97.5	78	251.3	118.9
29	26.2	12.4	79	71.4	33.8	29	116.6	55.2	79	161.8	76.5	29	207.0	97.9	79	252.2	119.3
30	27.1	12.8	80	72.3	34.2	30	117.5	55.6	80	162.7	77.0	30	207.9	98.3	80	253.1	119.7
31	28.0	13.3	81	73.2	34.6	131	118.4	56.0	181	163.6	77.4	231	208.8	98.8	281	254.0	120.2
32	28.9	13.7	82	74.1	35.1	32	119.3	56.4	82	164.5	77.8	32	209.7	99.2	82	254.9	120.6
33	29.8	14.1	83	75.0	35.5	33	120.2	56.9	83	165.4	78.2	33	210.6	99.6	83	255.8	121.0
34	30.7	14.5	84	75.9	35.9	34	121.1	57.3	84	166.3	78.7	34	211.5	100.1	84	256.7	121.4
35	31.6	15.0	85	76.8	36.3	35	122.0	57.7	85	167.2	79.1	35	212.4	100.5	85	257.6	121.9
36	32.5	15.4	86	77.7	36.8	136	122.9	58.2	186	168.1	79.5	236	213.3	100.9	286	258.5	122.3
37	33.4	15.8	87	78.6	37.2	37	123.8	58.6	87	169.0	80.0	37	214.2	101.3	87	259.4	122.7
38	34.4	16.2	88	79.6	37.6	38	124.7	59.0	88	169.9	80.4	38	215.1	101.8	88	260.3	123.1
39	35.3	16.7	89	80.5	38.1	39	125.6	59.4	89	170.8	80.8	39	216.0	102.2	89	261.2	123.6
40	36.2	17.1	90	81.4	38.5	40	126.5	59.9	90	171.7	81.2	40	216.9	102.6	90	262.1	124.0
41	37.1	17.5	91	82.3	38.9	141	127.4	60.3	191	172.6	81.7	241	217.8	103.0	291	263.0	124.4
42	38.0	18.0	92	83.2	39.3	42	128.4	60.7	92	173.6	82.1	42	218.7	103.5	92	263.9	124.9
43	38.9	18.4	93	84.1	39.8	43	129.3	61.1	93	174.5	82.5	43	219.6	103.9	93	264.8	125.3
44	39.8	18.8	94	85.0	40.2	44	130.2	61.6	94	175.4	83.0	44	220.5	104.3	94	265.7	125.7
45	40.7	19.2	95	85.9	40.6	45	131.1	62.0	95	176.3	83.4	45	221.4	104.8	95	266.6	126.1
46	41.6	19.7	96	86.8	41.0	146	132.0	62.4	196	177.2	83.8	246	222.4	105.2	296	267.6	126.6
47	42.5	20.1	97	87.7	41.5	47	132.9	62.9	97	178.1	84.2	47	223.3	105.6	97	268.5	127.0
48	43.4	20.5	98	88.6	41.9	48	133.8	63.3	98	179.0	84.7	48	224.2	106.0	98	269.4	127.4
49	44.3	21.0	99	89.5	42.3	49	134.7	63.7	99	179.9	85.1	49	225.1	106.5	99	270.3	127.8
50	45.2	21.4	100	90.4	42.8	150	135.6	64.1	200	180.8	85.5	250	226.0	106.9	300	271.2	128.3
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 5¼ Points

Difference of Latitude and Departure for 2½ Points 67

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.9	00.5	51	45.0	24.0	101	89.1	47.6	151	133.2	71.1	201	177.3	94.7	251	221.4	118.3
2	01.8	00.9	52	45.9	24.5	02	90.0	48.1	52	134.1	71.6	02	178.2	95.2	52	222.3	118.7
3	02.6	01.4	53	46.7	25.0	03	90.8	48.5	53	134.9	72.1	03	179.0	95.6	53	223.1	119.2
4	03.5	01.9	54	47.6	25.4	04	91.7	49.0	54	135.8	72.6	04	179.9	96.1	54	224.0	119.7
5	04.4	02.4	55	48.5	25.9	05	92.6	49.5	55	136.7	73.0	05	180.8	96.6	55	224.9	120.1
6	05.3	02.8	56	49.4	26.4	106	93.5	49.9	156	137.6	73.5	206	181.7	97.1	256	225.8	120.6
7	06.2	03.3	57	50.3	26.9	07	94.4	50.4	57	138.5	74.0	07	182.6	97.5	57	226.7	121.1
8	07.1	03.8	58	51.2	27.3	08	95.3	50.9	58	139.4	74.4	08	183.5	98.0	58	227.6	121.6
9	07.9	04.2	59	52.0	27.8	09	96.1	51.4	59	140.2	74.9	09	184.3	98.5	59	228.4	122.0
10	08.8	04.7	60	52.9	28.3	10	97.0	51.8	60	141.1	75.4	10	185.2	98.9	60	229.3	122.5
11	09.7	05.2	61	53.8	28.7	111	97.9	52.3	161	142.0	75.9	211	186.1	99.4	261	230.2	123.0
12	10.6	05.7	62	54.7	29.2	12	98.8	52.8	62	142.9	76.3	12	187.0	99.9	62	231.1	123.4
13	11.5	06.1	63	55.6	29.7	13	99.7	53.2	63	143.8	76.8	13	187.9	100.4	63	232.0	123.9
14	12.3	06.6	64	56.4	30.2	14	100.5	53.7	64	144.6	77.3	14	188.7	100.8	64	232.8	124.4
15	13.2	07.1	65	57.3	30.6	15	101.4	54.2	65	145.5	77.7	15	189.6	101.3	65	233.7	124.9
16	14.1	07.5	66	58.2	31.1	116	102.3	54.7	166	146.4	78.2	216	190.5	101.8	266	234.6	125.3
17	15.0	08.0	67	59.1	31.6	17	103.2	55.1	67	147.3	78.7	17	191.4	102.2	67	235.5	125.8
18	15.9	08.5	68	60.0	32.0	18	104.1	55.6	68	148.2	79.2	18	192.3	102.7	68	236.4	126.3
19	16.8	09.0	69	60.9	32.5	19	105.0	56.1	69	149.1	79.6	19	193.2	103.2	69	237.3	126.7
20	17.6	09.4	70	61.7	33.0	20	105.8	56.5	70	149.9	80.1	20	194.0	103.7	70	238.1	127.2
21	18.5	09.9	71	62.6	33.5	121	106.7	57.0	171	150.8	80.6	221	194.9	104.1	271	239.0	127.7
22	19.4	10.4	72	63.5	33.9	22	107.6	57.5	72	151.7	81.0	22	195.8	104.6	72	239.9	128.2
23	20.3	10.8	73	64.4	34.4	23	108.5	58.0	73	152.6	81.5	23	196.7	105.1	73	240.8	128.6
24	21.2	11.3	74	65.3	34.9	24	109.4	58.4	74	153.5	82.0	24	197.6	105.5	74	241.7	129.1
25	22.1	11.8	75	66.2	35.3	25	110.3	58.9	75	154.3	82.5	25	198.4	106.0	75	242.5	129.6
26	22.9	12.3	76	67.0	35.8	126	111.1	59.4	176	155.2	82.9	226	199.3	106.5	276	243.4	130.0
27	23.8	12.7	77	67.9	36.3	27	112.0	59.8	77	156.1	83.4	27	200.2	107.0	77	244.3	130.5
28	24.7	13.2	78	68.8	36.8	28	112.9	60.3	78	157.0	83.9	28	201.1	107.4	78	245.2	131.0
29	25.6	13.7	79	69.7	37.2	29	113.8	60.8	79	157.9	84.3	29	202.0	107.9	79	246.1	131.5
30	26.5	14.1	80	70.6	37.7	30	114.7	61.3	80	158.8	84.8	30	202.9	108.4	80	247.0	131.9
31	27.4	14.6	81	71.4	38.2	131	115.5	61.7	181	159.6	85.3	231	203.7	108.8	281	247.8	132.4
32	28.2	15.1	82	72.3	38.6	32	116.4	62.2	82	160.5	85.8	32	204.6	109.3	82	248.7	132.9
33	29.1	15.5	83	73.2	39.1	33	117.3	62.7	83	161.4	86.2	33	205.5	109.8	83	249.6	133.3
34	30.0	16.0	84	74.1	39.6	34	118.2	63.1	84	162.3	86.7	34	206.4	110.3	84	250.5	133.8
35	30.9	16.5	85	75.0	40.1	35	119.1	63.6	85	163.2	87.2	35	207.3	110.7	85	251.4	134.3
36	31.8	17.0	86	75.9	40.5	136	120.0	64.1	186	164.1	87.6	236	208.2	111.2	286	252.3	134.8
37	32.6	17.4	87	76.7	41.0	37	120.8	64.5	87	164.9	88.1	37	209.0	111.7	87	253.1	135.2
38	33.5	17.9	88	77.6	41.5	38	121.7	65.0	88	165.8	88.6	38	209.9	112.1	88	254.0	135.7
39	34.4	18.4	89	78.5	41.9	39	122.6	65.5	89	166.7	89.1	39	210.8	112.6	89	254.9	136.2
40	35.3	18.9	90	79.4	42.4	40	123.5	66.0	90	167.6	89.5	40	211.7	113.1	90	255.8	136.6
41	36.2	19.3	91	80.3	42.9	141	124.4	66.4	191	168.5	90.0	241	212.6	113.5	291	256.7	137.1
42	37.0	19.8	92	81.1	43.4	42	125.2	66.9	92	169.3	90.5	42	213.4	114.0	92	257.5	137.6
43	37.9	20.3	93	82.0	43.8	43	126.1	67.4	93	170.2	90.9	43	214.3	114.5	93	258.4	138.1
44	38.8	20.7	94	82.9	44.3	44	127.0	67.8	94	171.1	91.4	44	215.2	115.0	94	259.3	138.5
45	39.7	21.2	95	83.8	44.8	45	127.9	68.3	95	172.0	91.9	45	216.1	115.4	95	260.2	139.0
46	40.6	21.7	96	84.7	45.2	146	128.8	68.8	196	172.9	92.4	246	217.0	115.9	296	261.1	139.5
47	41.5	22.1	97	85.6	45.7	47	129.7	69.3	97	173.8	92.8	47	217.9	116.4	97	262.0	139.9
48	42.3	22.6	98	86.4	46.2	48	130.5	69.7	98	174.6	93.3	48	218.7	116.8	98	262.8	140.4
49	43.2	23.1	99	87.3	46.6	49	131.4	70.2	99	175.5	93.8	49	219.6	117.3	99	263.7	140.9
50	44.1	23.6	100	88.2	47.1	150	132.3	70.7	200	176.4	94.2	250	220.5	117.8	300	264.6	141.4
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 5½ Points.

68 Difference of Latitude and Departure for $2\frac{3}{4}$ Points

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.9	00.6	51	43.7	26.2	101	86.6	51.9	151	129.5	77.6	201	172.4	103.3	251	215.3	129.0
2	01.7	01.0	52	44.6	26.7	02	87.5	52.4	52	130.4	78.1	02	173.3	103.8	52	216.1	129.5
3	02.6	01.6	53	45.5	27.2	03	88.3	52.9	53	131.2	78.6	03	174.1	104.3	53	217.0	130.0
4	03.4	02.1	54	46.3	27.8	04	89.2	53.4	54	132.1	79.1	04	175.0	104.8	54	217.9	130.5
5	04.3	02.6	55	47.2	28.3	05	90.1	54.0	55	132.9	79.7	05	175.8	105.4	55	218.7	131.0
6	05.1	03.1	56	48.0	28.8	106	90.9	54.5	156	133.8	80.2	206	176.7	105.9	256	229.6	131.6
7	06.0	03.6	57	48.9	29.3	07	91.8	55.0	57	134.7	80.7	07	177.5	106.4	57	220.4	132.1
8	06.9	04.1	58	49.7	29.8	08	92.6	55.5	58	135.5	81.2	08	178.4	106.9	58	221.3	132.6
9	07.7	04.6	59	50.6	30.3	09	93.5	56.0	59	136.4	81.7	09	179.3	107.4	59	222.1	133.1
10	08.6	05.1	60	51.5	30.8	10	94.3	56.5	60	137.2	82.2	10	180.1	107.9	60	223.0	133.6
11	09.4	05.7	61	52.3	31.4	111	95.2	57.0	161	138.1	82.7	211	181.0	108.4	261	223.9	134.1
12	10.3	06.2	62	53.2	31.9	12	96.1	57.6	62	138.9	83.3	12	181.8	109.0	62	224.7	134.6
13	11.2	06.7	63	54.0	32.4	13	96.9	58.1	63	139.8	83.8	13	182.7	109.5	63	225.6	135.2
14	12.0	07.2	64	54.9	32.9	14	97.8	58.6	64	140.7	84.3	14	183.5	110.0	64	226.4	135.7
15	12.9	07.7	65	55.8	33.4	15	98.6	59.1	65	141.5	84.8	15	184.4	110.5	65	227.3	136.2
16	13.7	08.2	66	56.6	33.9	116	99.5	59.6	166	142.4	85.3	216	185.3	111.0	266	228.1	136.7
17	14.6	08.7	67	57.5	34.4	17	100.4	60.1	67	143.2	85.8	17	186.1	111.6	67	229.0	137.2
18	15.4	09.3	68	58.3	35.0	18	101.2	60.6	68	144.1	86.3	18	187.0	112.0	68	229.9	137.7
19	16.3	09.8	69	59.2	35.5	19	102.1	61.2	69	145.0	86.9	19	187.8	112.6	69	230.7	138.2
20	17.2	10.3	70	60.0	36.0	20	102.9	61.7	70	145.8	87.4	20	188.1	113.1	70	231.6	138.8
21	18.0	10.8	71	60.9	36.5	121	103.8	62.2	171	146.7	87.9	221	189.6	113.6	271	232.4	139.3
22	18.9	11.3	72	61.8	37.0	22	104.6	62.7	72	147.5	88.4	22	190.4	114.1	72	233.3	139.8
23	19.7	11.8	73	62.6	37.6	23	105.5	63.2	73	148.4	88.9	23	191.3	114.6	73	234.2	140.3
24	20.6	12.3	74	63.5	38.0	24	106.4	63.7	74	149.2	89.4	24	192.1	115.1	74	235.0	140.8
25	21.4	12.9	75	64.3	38.6	25	107.2	64.2	75	150.1	89.9	25	193.0	115.6	75	235.9	141.3
26	22.3	13.4	76	65.2	39.1	126	108.1	64.8	176	151.0	90.4	226	193.8	116.1	276	236.7	141.8
27	23.2	13.9	77	66.0	39.6	27	108.9	65.3	77	151.8	91.0	27	194.7	116.7	77	237.6	142.4
28	24.0	14.4	78	66.9	40.1	28	109.8	65.8	78	152.7	91.5	28	195.6	117.2	78	238.4	142.9
29	24.9	14.9	79	67.8	40.6	29	110.6	66.3	79	153.5	92.0	29	196.4	117.7	79	239.3	143.4
30	25.7	15.4	80	68.6	41.1	30	111.5	66.8	80	154.4	92.5	30	197.3	118.2	80	240.2	143.9
31	26.6	15.9	81	69.5	41.6	131	112.4	67.3	181	155.2	93.0	231	198.1	118.7	281	241.0	144.4
32	27.4	16.4	82	70.3	42.1	32	113.2	67.8	82	156.1	93.5	32	199.0	119.2	82	241.9	144.9
33	28.3	17.0	83	71.2	42.7	33	114.1	68.4	83	157.0	94.0	33	199.8	119.7	83	242.7	145.4
34	29.2	17.5	84	72.0	43.2	34	114.9	68.9	84	157.8	94.6	34	200.7	120.3	84	243.6	146.0
35	30.0	18.0	85	72.9	43.7	35	115.8	69.4	85	158.7	95.1	35	201.6	120.8	85	244.4	146.5
36	30.9	18.5	86	73.8	44.2	136	116.6	69.9	186	159.5	95.6	236	202.4	121.3	286	245.3	147.0
37	31.7	19.0	87	74.6	44.7	37	117.5	70.4	87	160.4	96.1	37	203.3	121.8	87	246.2	147.5
38	32.6	19.5	88	75.5	45.2	38	118.4	70.9	88	161.2	96.6	38	204.1	122.3	88	247.0	148.0
39	33.5	20.0	89	76.3	45.7	39	119.2	71.4	89	162.1	97.1	39	205.0	122.8	89	247.9	148.6
40	34.3	20.6	90	77.2	46.3	40	120.1	72.0	90	163.0	97.6	40	205.8	123.3	90	248.7	149.0
41	35.2	21.1	91	78.1	46.8	141	120.9	72.5	191	163.8	98.2	241	206.7	123.9	291	249.6	149.1
42	36.0	21.6	92	78.9	47.3	42	121.8	73.0	92	164.7	98.7	42	207.6	124.4	92	250.4	150.6
43	36.9	22.1	93	79.8	47.8	43	122.7	73.5	93	165.5	99.2	43	208.4	124.9	93	251.3	150.1
44	37.7	22.6	94	80.6	48.3	44	123.5	74.0	94	166.4	99.7	44	209.3	125.4	94	252.2	151.6
45	38.6	23.1	95	81.5	48.8	45	124.4	74.6	95	167.3	100.2	45	210.1	125.9	95	253.0	151.1
46	39.5	23.6	96	82.3	49.3	146	125.2	75.0	196	168.1	100.7	246	211.0	126.4	296	253.9	152.1
47	40.3	24.2	97	83.2	49.9	47	126.1	75.6	97	169.0	101.2	47	211.9	126.9	97	254.7	152.6
48	41.2	24.7	98	84.1	50.4	48	126.9	76.1	98	169.8	101.8	48	212.7	127.4	98	255.6	153.1
49	42.0	25.2	99	84.9	50.9	49	127.8	76.6	99	170.7	102.3	49	213.6	128.0	99	256.5	153.7
50	42.9	25.7	100	85.8	51.4	150	128.7	77.1	200	171.5	102.8	250	214.4	128.5	300	257.3	154.2
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for $5\frac{1}{4}$ Points

Difference of Latitude and Departure for 3 Points 69

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.8	00.6	51	42.4	28.3	101	84.0	56.1	151	125.5	83.9	201	167.1	111.7	251	208.7	139.4
2	01.7	01.1	52	43.2	28.9	02	84.8	56.7	52	126.4	84.4	02	167.9	112.2	52	209.5	140.0
3	02.5	01.7	53	44.1	29.4	03	85.6	57.2	53	127.2	85.0	03	168.8	112.8	53	210.3	140.5
4	03.3	02.2	54	44.9	30.0	04	86.5	57.8	54	128.0	85.5	04	169.6	113.3	54	211.2	141.1
5	04.2	02.8	55	45.7	30.6	05	87.3	58.3	55	128.9	86.1	05	170.4	113.9	55	212.0	141.7
6	05.0	03.3	56	46.6	31.1	106	88.1	58.9	156	129.7	86.7	206	171.3	114.4	256	212.8	142.2
7	05.8	03.9	57	47.4	31.7	07	89.0	59.4	57	130.5	87.2	07	172.1	115.0	57	213.7	142.8
8	06.7	04.4	58	48.2	32.2	08	89.8	60.0	58	131.4	87.8	08	172.9	115.5	58	214.5	143.3
9	07.5	05.0	59	49.1	32.8	09	90.6	60.5	59	132.2	88.3	09	173.8	116.1	59	215.3	143.9
10	08.3	05.6	60	49.9	33.3	10	91.4	61.1	60	133.0	88.9	10	174.6	116.7	60	216.1	144.4
11	09.1	06.1	61	50.7	33.9	111	92.3	61.7	161	133.8	89.4	211	175.4	117.2	261	217.0	145.0
12	10.0	06.7	62	51.5	34.4	12	93.1	62.2	62	134.7	90.0	12	176.2	117.8	62	217.8	145.5
13	10.8	07.2	63	52.4	35.0	13	93.9	62.8	63	135.5	90.5	13	177.1	118.3	63	218.6	146.1
14	11.6	07.8	64	53.2	35.6	14	94.8	63.3	64	136.3	91.1	14	177.9	118.9	64	219.5	146.7
15	12.5	08.3	65	54.0	36.1	15	95.6	63.9	65	137.2	91.7	15	178.7	119.4	65	220.3	147.2
16	13.3	08.9	66	54.9	36.7	116	96.4	64.4	166	138.0	92.2	216	179.6	120.0	266	221.1	147.8
17	14.1	09.4	67	55.7	37.2	17	97.3	65.0	67	138.8	92.8	17	180.4	120.5	67	222.0	148.3
18	15.0	10.0	68	56.5	37.8	18	98.1	65.5	68	139.7	93.3	18	181.2	121.1	68	222.8	148.9
19	15.8	10.6	69	57.4	38.3	19	98.9	66.1	69	140.5	93.9	19	182.1	121.7	69	223.6	149.4
20	16.6	11.1	70	58.2	38.9	20	99.7	66.7	70	141.3	94.4	20	182.9	122.2	70	224.5	150.0
21	17.5	11.7	71	59.0	39.4	121	100.6	67.2	171	142.2	95.0	221	183.7	122.8	271	225.3	150.5
22	18.3	12.2	72	59.9	40.0	22	101.4	67.8	72	143.0	95.5	22	184.6	123.3	72	226.1	151.1
23	19.1	12.8	73	60.7	40.6	23	102.3	68.3	73	143.8	96.1	23	185.4	123.9	73	227.0	151.7
24	20.0	13.3	74	61.5	41.1	24	103.1	68.9	74	144.7	96.7	24	186.2	124.4	74	227.8	152.2
25	20.8	13.9	75	62.4	41.7	25	103.9	69.4	75	145.5	97.2	25	187.1	125.0	75	228.6	152.8
26	21.6	14.4	76	63.2	42.2	126	104.8	70.0	176	146.3	97.8	226	187.9	125.5	276	229.4	153.3
27	22.4	15.0	77	64.0	42.8	27	105.6	70.5	77	147.1	98.3	27	188.7	126.1	77	230.3	153.9
28	23.3	15.6	78	64.8	43.3	28	106.4	71.1	78	148.0	98.9	28	189.5	126.7	78	231.1	154.4
29	24.1	16.1	79	65.7	43.9	29	107.2	71.7	79	148.8	99.4	29	190.4	127.2	79	231.9	155.0
30	24.9	16.7	80	66.5	44.4	30	108.1	72.2	80	149.6	100.0	30	191.2	127.8	80	232.8	155.5
31	25.8	17.2	81	67.3	45.0	131	108.9	72.8	181	150.5	100.5	231	192.0	128.3	281	233.6	156.1
32	26.6	17.8	82	68.2	45.6	32	109.7	73.3	82	151.3	101.1	32	192.9	128.9	82	234.4	156.7
33	27.4	18.3	83	69.0	46.1	33	110.6	73.9	83	152.1	101.7	33	193.7	129.4	83	235.3	157.2
34	28.3	18.9	84	69.8	46.7	34	111.4	74.4	84	153.0	102.2	34	194.5	130.0	84	236.1	157.8
35	29.1	19.4	85	70.7	47.2	35	112.2	75.0	85	153.8	102.8	35	195.4	130.5	85	236.9	158.3
36	29.9	20.0	86	71.5	47.8	136	113.1	75.5	186	154.6	103.3	236	196.2	131.1	286	237.8	158.9
37	30.8	20.6	87	72.3	48.3	37	113.9	76.1	87	155.5	103.9	37	197.0	131.7	87	238.6	159.4
38	31.6	21.1	88	73.2	48.9	38	114.7	76.7	88	156.3	104.4	38	197.9	132.2	88	239.4	160.0
39	32.4	21.7	89	74.0	49.4	39	115.6	77.2	89	157.1	105.0	39	198.7	132.8	89	240.3	160.5
40	33.3	22.2	90	74.8	50.0	40	116.4	77.8	90	158.0	105.5	40	199.5	133.3	90	241.1	161.1
41	34.1	22.8	91	75.7	50.6	141	117.2	78.3	191	158.8	106.1	241	200.4	133.9	291	241.9	161.7
42	34.9	23.3	92	76.5	51.1	42	118.1	78.9	92	159.6	106.7	42	201.2	134.4	92	242.8	162.2
43	35.8	23.9	93	77.3	51.7	43	118.9	79.4	93	160.4	107.2	43	202.0	135.0	93	243.6	162.8
44	36.6	24.4	94	78.1	52.2	44	119.7	80.0	94	161.3	107.8	44	202.8	135.5	94	244.4	163.3
45	37.4	25.0	95	79.0	52.8	45	120.5	80.5	95	162.1	108.3	45	203.7	136.1	95	245.2	163.9
46	38.2	25.6	96	79.8	53.3	146	121.4	81.1	196	162.9	108.9	246	204.5	136.7	296	246.1	164.4
47	39.1	26.1	97	80.6	53.9	47	122.2	81.7	97	163.8	109.4	47	205.3	137.2	97	246.9	165.0
48	39.9	26.7	98	81.5	54.4	48	123.0	82.2	98	164.6	110.0	48	206.2	137.8	98	247.7	165.5
49	40.7	27.2	99	82.3	55.0	49	123.9	82.8	99	165.4	110.5	49	207.0	138.3	99	248.6	166.1
50	41.6	27.8	100	83.1	55.6	150	124.7	83.3	200	166.3	111.1	250	207.8	138.9	300	249.4	166.7
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 5 Points.

70 Difference of Latitude and Departure for $3\frac{1}{4}$ Points

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	00.8	00.6	51	41.0	30.4	101	81.1	60.2	151	121.3	90.0	201	161.4	119.7	251	201.6	149.5
2	01.6	01.2	52	41.8	31.0	01	81.9	60.8	52	122.1	90.6	02	162.2	120.3	52	202.4	150.1
3	02.4	01.8	53	42.6	31.6	0	82.7	61.4	53	122.9	91.1	03	163.0	120.9	53	203.2	150.7
4	03.2	02.4	54	43.4	32.2	04	83.5	62.0	54	123.7	91.7	04	163.8	121.5	54	204.0	151.3
5	04.0	03.0	55	44.2	32.8	05	84.3	62.6	55	124.5	92.3	05	164.6	122.1	55	204.8	151.9
6	04.8	03.6	56	45.0	33.4	106	85.1	63.1	156	125.3	92.9	206	165.4	122.7	256	205.6	152.5
7	05.6	04.2	57	45.8	34.0	07	85.9	63.7	57	126.1	93.5	07	166.2	123.3	57	206.4	153.1
8	06.4	04.8	58	46.6	34.6	08	86.7	64.3	58	126.9	94.1	08	167.0	123.9	58	207.2	153.7
9	07.2	05.4	59	47.4	35.1	09	87.5	64.9	59	127.7	94.7	09	167.8	124.5	59	208.0	154.3
10	08.0	06.0	60	48.2	35.7	10	88.3	65.5	60	128.5	95.3	10	168.6	125.1	60	208.8	154.9
11	08.8	06.6	61	49.0	36.3	111	89.1	66.1	161	129.3	95.9	211	169.4	125.7	261	209.6	155.5
12	09.6	07.1	62	49.8	36.9	12	89.9	66.7	62	130.1	96.5	12	170.2	126.3	62	210.4	156.1
13	10.4	07.7	63	50.6	37.5	13	90.7	67.3	63	130.9	97.1	13	171.0	126.9	63	211.2	156.7
14	11.2	08.3	64	51.4	38.1	14	91.5	67.9	64	131.7	97.7	14	171.8	127.5	64	212.0	157.3
15	12.0	08.9	65	52.2	38.7	15	92.4	68.5	65	132.5	98.3	15	172.7	128.1	65	212.8	157.9
16	12.8	09.5	66	53.0	39.3	116	93.2	69.1	166	133.3	98.9	216	173.5	128.7	266	213.6	158.5
17	13.7	10.1	67	53.8	39.9	17	94.0	69.7	67	134.1	99.5	17	174.3	129.3	67	214.4	159.1
18	14.5	10.7	68	54.6	40.5	18	94.8	70.3	68	134.9	100.1	18	175.1	129.9	68	215.2	159.7
19	15.3	11.3	69	55.4	41.1	19	95.6	70.9	69	135.7	100.7	19	175.9	130.5	69	216.0	160.3
20	16.1	11.9	70	56.2	41.7	20	96.4	71.5	70	136.5	101.3	20	176.7	131.1	70	216.8	160.9
21	16.9	12.5	71	57.0	42.3	121	97.2	72.1	171	137.3	101.9	221	177.5	131.7	271	217.6	161.4
22	17.5	13.1	72	57.8	42.9	22	98.0	72.7	72	138.1	102.5	22	178.3	132.3	72	218.4	162.0
23	18.5	13.7	73	58.6	43.5	23	98.8	73.3	73	138.9	103.1	23	179.1	132.9	73	219.2	162.6
24	19.3	14.3	74	59.4	44.1	24	99.6	73.9	74	139.7	103.7	24	179.9	133.4	74	220.0	163.2
25	20.1	14.9	75	60.2	44.7	25	100.4	74.5	75	140.5	104.3	25	180.7	134.0	75	220.8	163.8
26	20.9	15.5	76	61.0	45.3	126	101.2	75.1	176	141.3	104.9	226	181.5	134.6	276	221.6	164.4
27	21.7	16.1	77	61.8	45.9	27	102.0	75.7	77	142.1	105.4	27	182.3	135.2	77	222.4	165.0
28	22.5	16.7	78	62.6	46.5	28	102.8	76.3	78	142.9	106.0	28	183.1	135.8	78	223.2	165.6
29	23.3	17.3	79	63.4	47.1	29	103.6	76.9	79	143.7	106.6	29	183.9	136.4	79	224.0	166.2
30	24.1	17.9	80	64.2	47.7	30	104.4	77.4	80	144.5	107.2	30	184.7	137.0	80	224.8	166.8
31	24.9	18.5	81	65.0	48.3	131	105.2	78.0	181	145.4	107.8	231	185.5	137.6	281	225.7	167.4
32	25.7	19.1	82	65.8	48.9	32	106.0	78.6	82	146.2	108.4	32	186.3	138.2	82	226.5	168.0
33	26.5	19.7	83	66.7	49.4	33	106.8	79.2	83	147.0	109.0	33	187.1	138.8	83	227.3	168.6
34	27.3	20.3	84	67.5	50.0	34	107.6	79.8	84	147.8	109.6	34	187.9	139.4	84	228.1	169.2
35	28.1	20.9	85	68.3	50.6	35	108.4	80.4	85	148.6	110.2	35	188.7	140.0	85	228.9	169.8
36	28.9	21.4	86	69.1	51.2	136	109.2	81.0	186	149.4	110.8	236	189.5	140.6	286	229.7	170.4
37	29.7	22.0	87	69.9	51.8	37	110.0	81.6	87	150.2	111.4	37	190.3	141.2	87	230.5	171.0
38	30.5	22.6	88	70.7	52.4	38	110.8	82.2	88	151.0	112.0	38	191.1	141.8	88	231.3	171.6
39	31.3	23.2	89	71.5	53.0	39	111.6	82.8	89	151.8	112.6	39	191.9	142.4	89	232.1	172.2
40	32.1	23.8	90	72.3	53.6	40	112.4	83.4	90	152.6	113.2	40	192.7	143.0	90	232.9	172.8
41	32.9	24.4	91	73.1	54.2	141	113.2	84.0	191	153.4	113.8	241	193.5	143.6	291	233.7	173.4
42	33.7	25.0	92	73.9	54.8	42	114.0	84.6	92	154.2	114.4	42	194.3	144.2	92	234.5	174.0
43	34.5	25.6	93	74.7	55.4	43	114.8	85.2	93	155.0	115.0	43	195.1	144.8	93	235.3	174.6
44	35.3	26.2	94	75.5	56.0	44	115.6	85.8	94	155.8	115.6	44	195.9	145.4	94	236.1	175.1
45	36.1	26.8	95	76.3	56.6	45	116.4	86.4	95	156.6	116.2	45	196.7	146.0	95	236.9	175.7
46	36.9	27.4	96	77.1	57.2	146	117.2	87.0	196	157.4	116.8	246	197.5	146.6	296	237.7	176.3
47	37.7	28.0	97	77.9	57.8	47	118.0	87.6	97	158.2	117.4	47	198.4	147.1	97	238.5	176.9
48	38.5	28.6	98	78.7	58.4	48	118.8	88.2	98	159.0	118.0	48	199.2	147.7	98	239.3	177.5
49	39.4	29.2	99	79.5	59.0	49	119.7	88.8	99	159.8	118.6	49	200.0	148.3	99	240.1	178.1
50	40.2	29.8	100	80.3	59.6	150	120.5	89.4	200	160.6	119.1	250	200.8	148.9	300	240.9	178.7
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for $4\frac{3}{4}$ Points

Difference of Latitude and Departure for 3½ Points 71

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.8	00.6	51	39.4	32.3	101	78.1	64.0	151	116.7	99.8	201	155.3	127.5	251	194.0	159.2
2	01.5	01.3	52	40.2	33.0	02	78.8	64.7	52	117.5	96.4	02	156.1	128.1	52	194.7	159.8
3	02.3	01.9	53	41.0	33.6	03	79.6	65.3	53	118.2	97.0	03	156.9	128.7	53	195.5	160.4
4	03.1	02.5	54	41.7	34.2	04	80.4	66.0	54	119.0	97.7	04	157.6	129.4	54	196.3	161.1
5	03.9	03.2	55	42.5	34.9	05	81.1	66.6	55	119.8	98.3	05	158.4	130.0	55	197.1	161.7
6	04.6	03.8	56	43.3	35.5	106	81.9	67.2	156	120.6	98.9	206	159.2	130.6	256	197.8	162.3
7	05.4	04.4	57	44.1	36.1	07	82.7	67.9	57	121.3	99.6	07	160.0	131.3	57	198.6	163.0
8	06.2	05.1	58	44.8	36.8	08	83.5	68.5	58	122.1	100.2	08	160.7	131.9	58	199.4	163.6
9	07.0	05.7	59	45.6	37.4	09	84.2	69.1	59	122.9	100.8	09	161.5	132.5	59	200.1	164.2
10	07.7	06.3	60	46.4	38.0	10	85.0	69.8	60	123.6	101.5	10	162.3	133.2	60	200.9	164.9
11	08.5	07.0	61	47.1	38.7	111	85.8	70.4	161	124.4	102.1	211	163.1	133.8	261	201.7	165.5
12	09.3	07.6	62	47.9	39.3	12	86.6	71.0	62	125.2	102.7	12	163.8	134.4	62	202.5	166.1
13	10.1	08.2	63	48.7	40.0	13	87.3	71.7	63	126.0	103.4	13	164.6	135.1	63	203.2	166.8
14	10.8	08.9	64	49.5	40.6	14	88.1	72.3	64	126.7	104.0	14	165.4	135.7	64	204.0	167.4
15	11.6	09.5	65	50.2	41.2	15	88.9	72.9	65	127.5	104.6	15	166.1	136.3	65	204.8	168.0
16	12.4	10.1	66	51.0	41.9	116	89.6	73.6	166	128.3	105.3	216	166.9	137.0	266	205.6	168.7
17	13.1	10.8	67	51.8	42.5	17	90.4	74.2	67	129.1	105.9	17	167.7	137.6	67	206.3	169.3
18	13.9	11.4	68	52.6	43.1	18	91.2	74.8	68	129.8	106.5	18	168.5	138.2	68	207.1	170.0
19	14.7	12.0	69	53.3	43.8	19	92.0	75.5	69	130.6	107.2	19	169.2	138.9	69	207.9	170.6
20	15.5	12.7	70	54.1	44.4	20	92.7	76.1	70	131.4	107.8	20	170.0	139.5	70	208.6	171.2
21	16.2	13.3	71	54.9	45.0	121	93.5	76.7	171	132.1	108.4	221	170.8	140.1	271	209.4	171.9
22	17.0	14.0	72	55.6	45.7	22	94.3	77.4	72	132.9	109.1	22	171.6	140.8	72	210.2	172.5
23	17.8	14.6	73	56.4	46.3	23	95.1	78.0	73	133.7	109.7	23	172.3	141.4	73	211.0	173.1
24	18.5	15.2	74	57.2	46.9	24	95.8	78.6	74	134.5	110.3	24	173.1	142.0	74	211.7	173.8
25	19.3	15.9	75	58.0	47.6	25	96.6	79.3	75	135.2	111.0	25	173.9	142.7	75	212.5	174.4
26	20.1	16.5	76	58.7	48.2	126	97.4	79.9	176	136.0	111.6	226	174.6	143.3	276	213.3	175.0
27	20.9	17.1	77	59.5	48.8	27	98.1	80.5	77	136.8	112.2	27	175.4	144.0	77	214.1	175.7
28	21.6	17.8	78	60.3	49.5	28	98.9	81.2	78	137.6	112.9	28	176.2	144.6	78	214.8	176.3
29	22.4	18.4	79	61.1	50.1	29	99.7	81.8	79	138.3	113.5	29	177.0	145.2	79	215.6	176.9
30	23.2	19.0	80	61.8	50.7	30	100.5	82.4	80	139.1	114.1	30	177.7	145.9	80	216.4	177.6
31	24.0	19.7	81	62.6	51.4	131	101.2	83.1	181	139.9	114.8	231	178.5	146.5	281	217.1	178.2
32	24.7	20.3	82	63.4	52.0	32	102.0	83.7	82	140.6	115.4	32	179.3	147.1	82	217.9	178.8
33	25.5	20.9	83	64.1	52.6	33	102.8	84.3	83	141.4	116.0	33	180.1	147.8	83	218.7	179.5
34	26.3	21.6	84	64.9	53.3	34	103.6	85.0	84	142.2	116.7	34	180.8	148.4	84	219.5	180.1
35	27.1	22.2	85	65.7	53.9	35	104.3	85.6	85	143.0	117.3	35	181.6	149.0	85	220.2	180.7
36	27.8	22.8	86	66.5	54.5	136	105.1	86.2	186	143.7	118.0	236	182.4	149.7	286	221.0	181.4
37	28.6	23.5	87	67.2	55.2	37	105.9	86.9	87	144.5	118.6	37	183.1	150.3	87	221.8	182.0
38	29.4	24.1	88	68.0	55.8	38	106.6	87.5	88	145.3	119.2	38	183.9	150.9	88	222.6	182.6
39	30.1	24.7	89	68.8	56.4	39	107.4	88.1	89	146.1	119.9	39	184.7	151.6	89	223.3	183.3
40	30.9	25.4	90	69.6	57.1	40	108.2	88.8	90	146.8	120.5	40	185.5	152.2	90	224.1	183.9
41	31.7	26.0	91	70.3	57.7	141	109.0	89.4	191	147.6	121.1	241	186.2	152.8	291	224.9	184.5
42	32.5	26.6	92	71.1	58.3	42	109.7	90.0	92	148.4	121.8	42	187.0	153.5	92	225.6	185.2
43	33.2	27.3	93	71.9	59.0	43	110.5	90.7	93	149.1	122.4	43	187.8	154.1	93	226.4	185.8
44	34.0	27.9	94	72.6	59.6	44	111.3	91.3	94	149.9	123.0	44	188.6	154.7	94	227.2	186.4
45	34.8	28.5	95	73.4	60.2	45	112.1	92.0	95	150.7	123.7	45	189.3	155.4	95	228.0	187.1
46	35.6	29.2	96	74.2	60.9	146	112.8	92.6	196	151.5	124.3	246	190.1	156.0	296	228.7	187.7
47	36.3	29.8	97	75.0	61.5	47	113.6	93.2	97	152.2	124.9	47	190.9	156.6	97	229.5	188.3
48	37.1	30.4	98	75.7	62.1	48	114.4	93.9	98	153.0	125.6	48	191.6	157.3	98	230.3	189.0
49	37.9	31.1	99	76.5	62.8	49	115.1	94.5	99	153.8	126.2	49	192.4	157.9	99	231.1	189.6
50	38.6	31.7	100	77.3	63.4	150	115.9	95.1	200	154.6	126.8	50	193.2	158.5	300	231.8	190.2
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 4½ Points.

72 Difference of Latitude and Departure for $3\frac{3}{4}$ Points

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.7	00.7	51	37.8	34.2	101	74.8	67.8	151	111.9	101.4	201	148.9	135.0	251	185.9	168.5
2	01.5	01.3	52	38.5	34.9	02	75.0	68.5	52	112.6	102.1	02	149.6	135.6	52	186.7	169.2
3	02.2	02.0	53	39.3	35.6	03	76.3	69.2	53	113.3	102.7	03	150.4	136.3	53	187.4	169.9
4	03.0	02.7	54	40.0	36.3	04	77.0	69.8	54	114.1	103.4	04	151.1	137.0	54	188.2	170.5
5	03.7	03.4	55	40.7	36.9	05	77.8	70.5	55	114.8	104.1	05	151.9	137.6	55	188.9	171.2
6	04.4	04.0	56	41.5	37.6	06	78.5	71.2	56	115.6	104.7	06	152.6	138.3	56	189.6	171.9
7	05.2	04.7	57	42.2	38.3	07	79.3	71.8	57	116.3	105.4	07	153.3	139.0	57	190.4	172.6
8	05.9	05.4	58	43.0	38.9	08	80.0	72.5	58	117.0	106.1	08	154.1	139.7	58	191.1	173.2
9	06.7	06.0	59	43.7	39.6	09	80.7	73.2	59	117.8	106.8	09	154.8	140.3	59	191.9	173.9
10	07.4	06.7	60	44.4	40.3	10	81.5	73.9	60	118.5	107.4	10	155.6	141.0	60	192.6	174.6
11	08.2	07.4	61	45.2	41.0	11	82.2	74.5	61	119.3	108.1	11	156.3	141.7	61	193.3	175.2
12	08.9	08.1	62	45.9	41.6	12	83.0	75.2	62	120.0	108.8	12	157.0	142.3	62	194.1	175.9
13	09.6	08.7	63	46.7	42.3	13	83.7	75.9	63	120.7	109.4	13	157.8	143.0	63	194.8	176.6
14	10.4	09.4	64	47.4	43.0	14	84.4	76.5	64	121.5	110.1	14	158.5	143.7	64	195.6	177.3
15	11.1	10.1	65	48.2	43.6	15	85.2	77.2	65	122.2	110.8	15	159.3	144.4	65	196.3	177.9
16	11.9	10.7	66	48.9	44.3	16	85.9	77.9	66	123.0	111.5	16	160.0	145.0	66	197.0	178.6
17	12.6	11.4	67	49.6	45.0	17	86.7	78.6	67	123.7	112.1	17	160.7	145.7	67	197.8	179.3
18	13.3	12.1	68	50.4	45.7	18	87.4	79.2	68	124.4	112.8	18	161.5	146.4	68	198.5	179.9
19	14.1	12.8	69	51.1	46.3	19	88.2	79.9	69	125.2	113.5	19	162.2	147.0	69	199.3	180.6
20	14.8	13.4	70	51.9	47.0	20	88.9	80.6	70	125.9	114.1	20	163.0	147.7	70	200.0	181.3
21	15.6	14.1	71	52.6	47.7	21	89.6	81.2	71	126.7	114.8	21	163.7	148.4	71	200.7	182.0
22	16.3	14.8	72	53.3	48.3	22	90.4	81.9	72	127.4	115.5	22	164.4	149.1	72	201.5	182.6
23	17.0	15.4	73	54.1	49.0	23	91.1	82.6	73	128.2	116.2	23	165.2	149.7	73	202.2	183.3
24	17.8	16.1	74	54.8	49.7	24	91.9	83.3	74	128.9	116.8	24	165.9	150.4	74	203.0	184.0
25	18.5	16.8	75	55.6	50.4	25	92.6	83.9	75	129.6	117.5	25	166.7	151.1	75	203.7	184.6
26	19.3	17.5	76	56.3	51.0	26	93.3	84.6	76	130.4	118.2	26	167.4	151.7	276	204.4	185.3
27	20.0	18.1	77	57.0	51.7	27	94.1	85.3	77	131.1	118.8	27	168.2	152.4	77	205.2	186.0
28	20.7	18.8	78	57.8	52.4	28	94.8	85.9	78	131.9	119.5	28	168.9	153.1	78	205.9	186.7
29	21.5	19.5	79	58.5	53.0	29	95.6	86.6	79	132.6	120.2	29	169.6	153.8	79	206.7	187.3
30	22.2	20.1	80	59.3	53.7	30	96.3	87.3	80	133.3	120.9	30	170.4	154.4	80	207.4	188.0
31	23.0	20.8	81	60.0	54.4	31	97.0	88.0	81	134.1	121.5	31	171.1	155.1	281	208.2	188.7
32	23.7	21.5	82	60.7	55.1	32	97.8	88.6	82	134.8	122.2	32	171.9	155.8	82	208.9	189.3
33	24.4	22.2	83	61.5	55.7	33	98.5	89.3	83	135.6	122.9	33	172.6	156.4	83	209.6	190.0
34	25.2	22.8	84	62.2	56.4	34	99.3	90.0	84	136.3	123.5	34	173.3	157.1	84	210.4	190.7
35	25.9	23.5	85	63.0	57.1	35	100.0	90.6	85	137.0	124.2	35	174.1	157.8	85	211.1	191.4
36	26.7	24.2	86	63.7	57.7	36	100.7	91.3	86	137.8	124.9	36	174.8	158.5	286	211.9	192.0
37	27.4	24.8	87	64.4	58.4	37	101.5	92.0	87	138.5	125.6	37	175.6	159.1	87	212.6	192.7
38	28.2	25.5	88	65.2	59.1	38	102.2	92.7	88	139.3	126.2	38	176.3	159.8	88	213.3	193.4
39	28.9	26.2	89	65.9	59.8	39	103.0	93.3	89	140.0	126.9	39	177.0	160.5	89	214.1	194.0
40	29.6	26.9	90	66.7	60.4	40	103.7	94.0	90	140.7	127.0	40	177.8	161.1	90	214.8	194.7
41	30.4	27.5	91	67.4	61.1	41	104.4	94.7	91	141.5	128.2	241	178.5	161.8	291	215.6	195.4
42	31.1	28.2	92	68.2	61.8	42	105.2	95.3	92	142.2	128.9	42	179.3	162.5	92	216.3	196.1
43	31.9	28.9	93	68.9	62.4	43	105.9	96.0	93	143.0	129.6	43	180.0	163.2	93	217.0	196.7
44	32.6	29.5	94	69.6	63.1	44	106.7	96.7	94	143.7	130.3	44	180.7	163.8	94	217.8	197.5
45	33.3	30.2	95	70.4	63.8	45	107.4	97.4	95	144.4	130.9	45	181.5	164.5	95	218.5	198.1
46	34.1	30.9	96	71.1	64.5	46	108.2	98.0	96	145.2	131.6	246	182.2	165.2	296	219.3	198.7
47	34.8	31.6	97	71.9	65.1	47	108.9	98.7	97	145.9	132.3	47	183.0	165.8	97	210.0	199.4
48	35.6	32.2	98	72.6	65.8	48	109.6	99.4	98	146.7	132.9	48	183.7	166.5	98	210.7	200.1
49	36.3	32.9	99	73.3	66.5	49	110.4	100.0	99	147.4	133.6	49	184.4	167.2	99	211.5	200.8
50	37.0	33.6	100	74.1	67.1	150	111.1	100.7	200	148.2	134.3	50	185.2	167.9	300	212.2	201.4
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for $4\frac{1}{4}$ Points.

Difference of Latitude and Departure for 4 Points

73

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.7	00.7	51	36.1	36.1	101	71.4	71.4	151	106.8	106.8	201	142.1	142.1	251	177.5	177.5
2	01.4	01.4	52	36.8	36.8	02	72.1	72.1	52	107.5	107.5	02	142.8	142.8	52	178.2	178.2
3	02.1	02.1	53	37.5	37.5	03	72.8	72.8	53	108.2	108.2	03	143.5	143.5	53	178.9	178.9
4	02.8	02.8	54	38.2	38.2	04	73.5	73.5	54	108.9	108.9	04	144.2	144.2	54	179.6	179.6
5	03.5	03.5	55	38.9	38.9	05	74.2	74.2	55	109.6	109.6	05	144.9	144.9	55	180.3	180.3
6	04.2	04.2	56	39.6	39.6	106	74.9	74.9	156	110.3	110.3	206	145.7	145.7	256	181.0	181.0
7	04.9	04.9	57	40.3	40.3	07	75.7	75.7	57	111.0	111.0	07	146.4	146.4	57	181.7	181.7
8	05.7	05.7	58	41.0	41.0	08	76.4	76.4	58	111.7	111.7	08	147.1	147.1	58	182.4	182.4
9	06.4	06.4	59	41.7	41.7	09	77.1	77.1	59	112.4	112.4	09	147.8	147.8	59	183.1	183.1
10	07.1	07.1	60	42.4	42.4	10	77.8	77.8	60	113.1	113.1	10	148.5	148.5	60	183.8	183.8
11	07.8	07.8	61	43.1	43.1	111	78.5	78.5	161	113.8	113.8	211	149.2	149.2	261	184.5	184.5
12	08.5	08.5	62	43.8	43.8	12	79.2	79.2	62	114.5	114.5	12	149.9	149.9	62	185.3	185.3
13	09.2	09.2	63	44.5	44.5	13	79.9	79.9	63	115.3	115.3	13	150.6	150.6	63	186.0	186.0
14	09.9	09.9	64	45.3	45.3	14	80.6	80.6	64	116.0	116.0	14	151.3	151.3	64	186.7	186.7
15	10.6	10.6	65	46.0	46.0	15	81.3	81.3	65	116.7	116.7	15	152.0	152.0	65	187.4	187.4
16	11.3	11.3	66	46.7	46.7	116	82.0	82.0	166	117.4	117.4	216	152.7	152.7	266	188.1	188.1
17	12.0	12.0	67	47.4	47.4	17	82.7	82.7	67	118.1	118.1	17	153.4	153.4	67	188.8	188.8
18	12.7	12.7	68	48.1	48.1	18	83.4	83.4	68	118.8	118.8	18	154.1	154.1	68	189.5	189.5
19	13.4	13.4	69	48.8	48.8	19	84.1	84.1	69	119.5	119.5	19	154.8	154.8	69	190.2	190.2
20	14.1	14.1	70	49.5	49.5	20	84.8	84.8	70	120.2	120.2	20	155.6	155.6	70	190.9	190.9
21	14.8	14.8	71	50.2	50.2	121	85.6	85.6	171	120.9	120.9	221	156.3	156.3	271	191.6	191.6
22	15.6	15.6	72	50.9	50.9	22	86.3	86.3	72	121.6	121.6	22	157.0	157.0	72	192.3	192.3
23	16.3	16.3	73	51.6	51.6	23	87.0	87.0	73	122.3	122.3	23	157.7	157.7	73	193.0	193.0
24	17.0	17.0	74	52.3	52.3	24	87.7	87.7	74	123.0	123.0	24	158.4	158.4	74	193.7	193.7
25	17.7	17.7	75	53.0	53.0	25	88.4	88.4	75	123.7	123.7	25	159.1	159.1	75	194.4	194.4
26	18.4	18.4	76	53.7	53.7	126	89.1	89.1	176	124.4	124.4	226	159.8	159.8	276	195.2	195.2
27	19.1	19.1	77	54.4	54.4	27	89.8	89.8	77	125.2	125.2	27	160.5	160.5	77	195.9	195.9
28	19.8	19.8	78	55.2	55.2	28	90.5	90.5	78	125.9	125.9	28	161.2	161.2	78	196.6	196.6
29	20.5	20.5	79	55.9	55.9	29	91.2	91.2	79	126.6	126.6	29	161.9	161.9	79	197.3	197.3
30	21.2	21.2	80	56.6	56.6	30	91.9	91.9	80	127.3	127.3	30	162.6	162.6	80	198.0	198.0
31	21.9	21.9	81	57.3	57.3	131	92.6	92.6	181	128.0	128.0	231	163.3	163.3	281	198.7	198.7
32	22.6	22.6	82	58.0	58.0	32	93.3	93.3	82	128.7	128.7	32	164.0	164.0	82	199.4	199.4
33	23.3	23.3	83	58.7	58.7	33	94.0	94.0	83	129.4	129.4	33	164.7	164.7	83	200.1	200.1
34	24.0	24.0	84	59.4	59.4	34	94.7	94.7	84	130.1	130.1	34	165.5	165.5	84	200.8	200.8
35	24.7	24.7	85	60.1	60.1	35	95.5	95.5	85	130.8	130.8	35	166.2	166.2	85	201.5	201.5
36	25.5	25.5	86	60.8	60.8	136	96.2	96.2	186	131.5	131.5	236	166.9	166.9	286	202.2	202.2
37	26.2	26.2	87	61.5	61.5	37	96.9	96.9	87	132.2	132.2	37	167.6	167.6	87	202.9	202.9
38	26.9	26.9	88	62.2	62.2	38	97.6	97.6	88	132.9	132.9	38	168.3	168.3	88	203.6	203.6
39	27.6	27.6	89	62.9	62.9	39	98.3	98.3	89	133.6	133.6	39	169.0	169.0	89	204.3	204.3
40	28.3	28.3	90	63.6	63.6	40	99.0	99.0	90	134.3	134.3	40	169.7	169.7	90	205.1	205.1
41	29.0	29.0	91	64.3	64.3	141	99.7	99.7	191	135.1	135.1	241	170.4	170.4	291	205.8	205.8
42	29.7	29.7	92	65.1	65.1	42	100.4	100.4	92	135.8	135.8	42	171.1	171.1	92	206.5	206.5
43	30.4	30.4	93	65.8	65.8	43	101.1	101.1	93	136.5	136.5	43	171.8	171.8	93	207.2	207.2
44	31.1	31.1	94	66.5	66.5	44	101.8	101.8	94	137.2	137.2	44	172.5	172.5	94	207.9	207.9
45	31.8	31.8	95	67.2	67.2	45	102.5	102.5	95	137.9	137.9	45	173.2	173.2	95	208.6	208.6
46	32.5	32.5	96	67.9	67.9	146	103.2	103.2	196	138.6	138.6	246	173.9	173.9	296	209.3	209.3
47	33.2	33.2	97	68.6	68.6	47	103.9	103.9	97	139.3	139.3	47	174.6	174.6	97	210.0	210.0
48	33.9	33.9	98	69.3	69.3	48	104.6	104.6	98	140.0	140.0	48	175.4	175.4	98	210.7	210.7
49	34.6	34.6	99	70.0	70.0	49	105.4	105.4	99	140.7	140.7	49	176.1	176.1	99	211.4	211.4
50	35.4	35.4	100	70.7	70.7	150	106.1	106.1	200	141.4	141.4	250	176.8	176.8	300	212.1	212.1
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 4 Points

A TABLE of Numbers for the reader finding the Time of High-water on any Day.

Year 1779.													Year 1780.														
Month	Days	January	February	March	April	May	June	July	August	September	October	November	December	Month	Days	January	February	March	April	May	June	July	August	September	October	November	December
1	23	25	24	25	26	27	28	29	31	31	33	33	1	34	36	35	36	37	38	39	11	13	13	15	15		
2	24	26	25	26	27	28	29	30	32	32	34	34	2	35	37	36	37	38	39	40	12	14	14	16	16		
3	25	27	26	27	28	29	30	31	33	33	35	35	3	36	38	37	38	39	40	11	13	15	15	17	17		
4	26	28	27	28	29	30	31	32	34	34	36	36	4	37	39	38	39	40	11	12	14	16	16	18	18		
5	27	29	28	29	30	31	32	33	35	35	37	37	5	38	40	39	40	11	12	13	15	17	17	19	19		
6	28	30	29	30	31	32	33	34	36	36	38	38	6	39	11	40	11	12	13	14	16	18	18	20	20		
7	29	31	30	31	32	33	34	35	37	37	39	39	7	40	12	11	12	13	14	15	17	19	19	21	21		
8	30	32	31	32	33	34	35	36	38	38	40	40	8	11	13	12	13	14	15	16	18	20	20	22	22		
9	31	33	32	33	34	35	36	37	39	39	11	11	9	12	14	13	14	15	16	17	19	21	21	23	23		
10	32	34	33	34	35	36	37	38	40	40	12	12	10	13	15	14	15	16	17	18	20	22	22	24	24		
11	33	35	34	35	36	37	38	39	11	11	13	13	11	14	16	15	16	17	18	19	21	23	23	25	25		
12	34	36	35	36	37	38	39	40	12	12	14	14	12	15	17	16	17	18	19	20	22	24	24	26	26		
13	35	37	36	37	38	39	40	11	13	13	15	15	13	16	18	17	18	19	20	21	23	25	25	27	27		
14	36	38	37	38	39	40	11	12	14	14	16	16	14	17	19	18	19	20	21	22	24	26	26	28	28		
15	37	39	38	39	40	11	12	13	15	15	17	17	15	18	20	19	20	21	22	23	25	27	27	29	29		
16	38	40	39	40	11	12	13	14	16	16	18	18	16	19	21	20	21	22	23	24	26	28	28	30	30		
17	39	11	40	11	12	13	14	15	17	17	19	19	17	20	22	21	22	23	24	25	27	29	29	31	31		
18	40	12	11	12	13	14	15	16	18	18	20	20	18	21	23	22	23	24	25	26	28	30	30	32	32		
19	11	13	12	13	14	15	16	17	19	19	21	21	19	22	24	23	24	25	26	27	29	31	31	33	33		
20	12	14	13	14	15	16	17	18	20	20	22	22	20	23	25	24	25	26	27	28	30	32	32	34	34		
21	13	15	14	15	16	17	18	19	21	21	23	23	21	24	26	25	26	27	28	29	31	33	33	35	35		
22	14	16	15	16	17	18	19	20	22	22	24	24	22	25	27	26	27	28	29	30	32	34	34	36	36		
23	15	17	16	17	18	19	20	21	23	23	25	25	23	26	28	27	28	29	30	31	33	35	35	37	37		
24	16	18	17	18	19	20	21	22	24	24	26	26	24	27	29	28	29	30	31	32	34	36	36	38	38		
25	17	19	18	19	20	21	22	23	25	25	27	27	25	28	30	29	30	31	32	33	35	37	37	39	39		
26	18	20	19	20	21	22	23	24	26	26	28	28	26	29	31	30	31	32	33	34	36	38	38	40	40		
27	19	21	20	21	22	23	24	25	27	27	29	29	27	30	32	31	32	33	34	35	37	39	39	11	11		
28	20	22	21	22	23	24	25	26	28	28	30	30	28	31	33	32	33	34	35	36	38	40	40	12	12		
29	21		22	23	24	25	26	27	29	29	31	31	29	32	34	33	34	35	36	37	39	11	11	13	13		
30	22		23	24	25	26	27	28	30	30	32	32	30	33		34	35	36	37	38	40	12	12	14	14		
31	23		24	26		28	29	31	33		33		31	34		35	37		39	11		13					

A TABLE of Numbers for the reader finding the Time of High-water on any Day.

Year 1781.													Year 1782.												
Month Days	January	February	March	April	May	June	July	August	September	October	November	December	Month Days	January	February	March	April	May	June	July	August	September	October	November	December
1	15	17	16	17	18	19	20	21	23	23	25	25	1	26	28	27	28	29	30	31	32	34	34	36	36
2	16	18	17	18	19	20	21	22	24	24	26	26	2	27	29	28	29	30	31	32	33	35	35	37	37
3	17	19	18	19	20	21	22	23	25	25	27	27	3	28	30	29	30	31	32	33	34	36	36	38	38
4	18	20	19	20	21	22	23	24	26	26	28	28	4	29	31	30	31	32	33	34	35	37	37	39	39
5	19	21	20	21	22	23	24	25	27	27	29	29	5	30	32	31	32	33	34	35	36	38	38	40	40
6	20	22	21	22	23	24	25	26	28	28	30	30	6	31	33	32	33	34	35	36	37	39	39	11	11
7	21	23	22	23	24	25	26	27	29	29	31	31	7	32	34	33	34	35	36	37	38	40	40	12	12
8	22	24	23	24	25	26	27	28	30	30	32	32	8	33	35	34	35	36	37	38	39	11	11	13	13
9	23	25	24	25	26	27	28	29	31	31	33	33	9	34	36	35	36	37	38	39	40	12	12	14	14
10	24	26	25	26	27	28	29	30	32	32	34	34	10	35	37	36	37	38	39	40	11	13	13	15	15
11	25	27	26	27	28	29	30	31	33	33	35	35	11	36	38	37	38	39	40	11	12	14	14	16	16
12	26	28	27	28	29	30	31	32	34	34	36	36	12	37	39	38	39	40	11	12	13	15	15	17	17
13	27	29	28	29	30	31	32	33	35	35	37	37	13	38	40	39	40	11	12	13	14	16	16	18	18
14	28	30	29	30	31	32	33	34	36	36	38	38	14	39	11	40	11	12	13	14	15	17	17	19	19
15	29	31	30	31	32	33	34	35	37	37	39	39	15	40	12	11	12	13	14	15	16	18	18	20	20
16	30	32	31	32	33	34	35	36	38	38	40	40	16	11	13	12	13	14	15	16	17	19	19	21	21
17	31	33	32	33	34	35	36	37	39	39	11	11	17	12	14	13	14	15	16	17	18	20	20	22	22
18	32	34	33	34	35	36	37	38	40	40	12	12	18	13	15	14	15	16	17	18	19	21	21	23	23
19	33	35	34	35	36	37	38	39	11	11	13	13	19	14	16	15	16	17	18	19	20	22	22	24	24
20	34	36	35	36	37	38	39	40	12	12	14	14	20	15	17	16	17	18	19	20	21	23	23	25	25
21	35	37	36	37	38	39	40	11	13	13	15	15	21	16	18	17	18	19	20	21	22	24	24	26	26
22	36	38	37	38	39	40	11	12	14	14	16	16	22	17	19	18	19	20	21	22	23	25	25	27	27
23	37	39	38	39	40	11	12	13	15	15	17	17	23	18	20	19	20	21	22	23	24	26	26	28	28
24	38	40	39	40	11	12	13	14	16	16	18	18	24	19	21	20	21	22	23	24	25	27	27	29	29
25	39	11	40	11	12	13	14	15	17	17	19	19	25	20	22	21	22	23	24	25	26	28	28	30	30
26	40	12	11	12	13	14	15	16	18	18	20	20	26	21	23	22	23	24	25	26	27	29	29	31	31
27	11	13	12	13	14	15	16	17	19	19	21	21	27	22	24	23	24	25	26	27	28	30	30	32	32
28	12	14	13	14	15	16	17	18	20	20	22	22	28	23	25	24	25	26	27	28	29	31	31	33	33
29	13	15	14	15	16	17	18	19	21	21	23	23	29	24	26	25	26	27	28	29	30	32	32	34	34
30	14	16	15	16	17	18	19	20	22	22	24	24	30	25	27	26	27	28	29	30	31	33	33	35	35
31	15	17	16	17	18	19	20	21	23	23	25	25	31	26	28	27	28	29	30	31	32	34	34	36	36

A TABLE of Numbers for the reader finding the Time of High-water on any Day.

Year 1783.													Year 1784.												
Month Days	January	February	March	April	May	June	July	August	September	October	November	December	Month Days	January	February	March	April	May	June	July	August	September	October	November	December
1	38	39	39	40	40	11	12	14	15	16	17	18	1	18	20	19	20	21	22	23	24	25	26	28	28
2	39	40	40	11	11	12	13	15	16	17	18	19	2	19	21	20	21	22	23	24	25	26	27	29	29
3	40	11	11	12	12	13	14	16	17	18	19	20	3	20	22	21	22	23	24	25	26	27	28	30	30
4	11	12	12	13	13	14	15	17	18	19	20	21	4	21	23	22	23	24	25	26	27	28	29	31	31
5	12	13	13	14	14	15	16	18	19	20	21	22	5	22	24	23	24	25	26	27	28	29	30	32	32
6	13	14	14	15	15	16	17	19	20	21	22	23	6	23	25	24	25	26	27	28	29	30	31	33	33
7	14	15	15	16	16	17	18	20	21	22	23	24	7	24	26	25	26	27	28	29	30	31	32	34	34
8	15	16	16	17	17	18	19	21	22	23	24	25	8	25	27	26	27	28	29	30	31	32	33	35	35
9	16	17	17	18	18	19	20	22	23	24	25	26	9	26	28	27	28	29	30	31	32	33	34	36	36
10	17	18	18	19	19	20	21	23	24	25	26	27	10	27	29	28	29	30	31	32	33	34	35	37	37
11	18	19	19	20	20	21	22	24	25	26	27	28	11	28	30	29	30	31	32	33	34	35	36	38	38
12	19	20	20	21	21	22	23	25	26	27	28	29	12	29	31	30	31	32	33	34	35	36	37	39	39
13	20	21	21	22	22	23	24	26	27	28	29	30	13	30	32	31	32	33	34	35	36	37	38	40	40
14	21	22	22	23	23	24	25	27	28	29	30	31	14	31	33	32	33	34	35	36	37	38	39	11	11
15	22	23	23	24	24	25	26	28	29	30	31	32	15	32	34	33	34	35	36	37	38	39	40	12	12
16	23	24	24	25	25	26	27	29	30	31	32	33	16	33	35	34	35	36	37	38	39	40	11	13	13
17	24	25	25	26	26	27	28	30	31	32	33	34	17	34	36	35	36	37	38	39	40	11	12	14	14
18	25	26	26	27	27	28	29	31	32	33	34	35	18	35	37	36	37	38	39	40	11	12	13	15	15
19	26	27	27	28	28	29	30	32	33	34	35	36	19	36	38	37	38	39	40	11	12	13	14	16	16
20	27	28	28	29	29	30	31	33	34	35	36	37	20	37	39	38	39	40	11	12	13	14	15	17	17
21	28	29	29	30	30	31	32	34	35	36	37	38	21	38	40	39	40	11	12	13	14	15	16	18	18
22	29	30	30	31	31	32	33	35	36	37	38	39	22	39	11	40	11	12	13	14	15	16	17	19	19
23	30	31	31	32	32	33	34	36	37	38	39	40	23	40	12	11	12	13	14	15	16	17	18	20	20
24	31	32	32	33	33	34	35	37	38	39	40	11	24	11	13	12	13	14	15	16	17	18	19	21	21
25	32	33	33	34	34	35	36	38	39	40	11	12	25	12	14	13	14	15	16	17	18	19	20	22	22
26	33	34	34	35	35	36	37	39	40	11	12	13	26	13	15	14	15	16	17	18	19	20	21	23	23
27	34	35	35	36	36	37	38	40	11	12	13	14	27	14	16	15	16	17	18	19	20	21	22	24	24
28	35	36	36	37	37	38	39	11	12	13	14	15	28	15	17	16	17	18	19	20	21	22	23	25	25
29	36	37	37	38	38	39	40	12	13	14	15	16	29	16	18	17	18	19	20	21	22	23	24	26	26
30	37	38	38	39	39	40	11	13	14	15	16	17	30	17	18	19	20	21	22	23	24	25	27	27	
31	38	39	40	12	14	16	18						31	18	19	21	23	24	26	28	28				

A TABLE of Numbers for the reader finding the Time of High-water on any Day.

Year 1785.

Month Days	January	February	March	April	May	June	July	August	September	October	November	December
1	28	29	30	30	29	29	27	28	30	31	30	30
2	29	30	31	31	30	30	28	29	31	32	31	31
3	30	31	32	32	31	31	29	30	32	33	32	32
4	31	32	33	33	32	32	30	31	33	34	33	33
5	32	33	34	34	33	33	31	32	34	35	34	34
6	33	34	35	35	34	34	32	33	35	36	35	35
7	34	35	36	36	35	35	33	34	36	37	36	36
8	35	36	37	37	36	36	34	35	37	38	37	37
9	36	37	38	38	37	37	35	36	38	39	38	38
10	37	38	39	39	38	38	36	37	39	40	39	39
11	38	39	40	40	39	39	37	38	40	41	40	40
12	39	40	41	41	40	40	38	39	41	42	41	41
13	40	41	42	42	41	41	39	40	42	43	42	42
14	41	42	43	43	42	42	40	41	43	44	43	43
15	42	43	44	44	43	43	41	42	44	45	44	44
16	43	44	45	45	44	44	42	43	45	46	45	45
17	44	45	46	46	45	45	43	44	46	47	46	46
18	45	46	47	47	46	46	44	45	47	48	47	47
19	46	47	48	48	47	47	45	46	48	49	48	48
20	47	48	49	49	48	48	46	47	49	50	49	49
21	48	49	50	50	49	49	47	48	50	51	50	50
22	49	50	51	51	50	50	48	49	51	52	51	51
23	50	51	52	52	51	51	49	50	52	53	52	52
24	51	52	53	53	52	52	50	51	53	54	53	53
25	52	53	54	54	53	53	51	52	54	55	54	54
26	53	54	55	55	54	54	52	53	55	56	55	55
27	54	55	56	56	55	55	53	54	56	57	56	56
28	55	56	57	57	56	56	54	55	57	58	57	57
29	56	57	58	58	57	57	55	56	58	59	58	58
30	57	58	59	59	58	58	56	57	59	60	59	59
31	58	59	60	60	59	59	57	58	60	61	60	60

Year 1786.

Month Days	January	February	March	April	May	June	July	August	September	October	November	December
1	11	11	11	12	13	15	17	17	18	19	19	20
2	12	12	12	13	14	16	18	18	19	20	20	21
3	13	13	13	14	15	17	19	19	20	21	21	22
4	14	14	14	15	16	18	20	20	21	22	22	23
5	15	15	15	16	17	19	21	21	22	23	23	24
6	16	16	16	17	18	20	22	22	23	24	24	25
7	17	17	17	18	19	21	23	23	24	25	25	26
8	18	18	18	19	20	22	24	24	25	26	26	27
9	19	19	19	20	21	23	25	25	26	27	27	28
10	20	20	20	21	22	24	26	26	27	28	28	29
11	21	21	21	22	23	25	27	27	28	29	29	30
12	22	22	22	23	24	26	28	28	29	30	30	31
13	23	23	23	24	25	27	29	29	30	31	31	32
14	24	24	24	25	26	28	30	30	31	32	32	33
15	25	25	25	26	27	29	31	31	32	33	33	34
16	26	26	26	27	28	30	32	32	33	34	34	35
17	27	27	27	28	29	31	33	33	34	35	35	36
18	28	28	28	29	30	32	34	34	35	36	36	37
19	29	29	29	30	31	33	35	35	36	37	37	38
20	30	30	30	31	32	34	36	36	37	38	38	39
21	31	31	31	32	33	35	37	37	38	39	39	40
22	32	32	32	33	34	36	38	38	39	40	40	41
23	33	33	33	34	35	37	39	39	40	41	41	42
24	34	34	34	35	36	38	40	40	41	42	42	43
25	35	35	35	36	37	39	41	41	42	43	43	44
26	36	36	36	37	38	40	42	42	43	44	44	45
27	37	37	37	38	39	41	43	43	44	45	45	46
28	38	38	38	39	40	42	44	44	45	46	46	47
29	39	39	39	40	41	43	45	45	46	47	47	48
30	40	40	40	41	42	44	46	46	47	48	48	49
31	41	41	41	42	43	45	47	47	48	49	49	50

A TABLE of Num- bers, &c.

Year 1787.

Month Days	January	February	March	April	May	June	July	August	September	October	November	December
1	22	24	23	24	25	27	28	29	30	32	33	34
2	23	25	24	25	26	28	29	30	31	33	34	35
3	24	26	25	26	27	29	30	31	32	34	35	36
4	25	27	26	27	28	30	31	32	33	35	36	37
5	26	28	27	28	29	31	32	33	34	36	37	38
6	27	29	28	29	30	32	33	34	35	37	38	39
7	28	30	29	30	31	33	34	35	36	38	39	40
8	29	31	30	31	32	34	35	36	37	39	40	11
9	30	32	31	32	33	35	36	37	38	40	11	12
10	31	33	32	33	34	36	37	38	39	11	12	13
11	32	34	33	34	35	37	38	39	40	12	13	14
12	33	35	34	35	36	38	39	40	11	13	14	15
13	34	36	35	36	37	39	40	11	12	14	15	16
14	35	37	36	37	38	40	11	12	13	15	16	17
15	36	38	37	38	39	11	12	13	14	16	17	18
16	37	39	38	39	40	12	13	14	15	17	18	19
17	38	40	39	40	11	13	14	15	16	18	19	20
18	39	11	40	11	12	14	15	16	17	19	20	21
19	40	12	11	12	13	15	16	17	18	20	21	22
20	11	13	12	13	14	16	17	18	19	21	22	23
21	12	14	13	14	15	17	18	19	20	22	23	24
22	13	15	14	15	16	18	19	20	21	23	24	25
23	14	16	15	16	17	19	20	21	22	24	25	26
24	15	17	16	17	18	20	21	22	23	25	26	27
25	16	18	17	18	19	21	22	23	24	26	27	28
26	17	19	18	19	20	22	23	24	25	27	28	29
27	18	20	19	20	21	23	24	25	26	28	29	30
28	19	21	20	21	22	24	25	26	27	29	30	31
29	20	22	21	22	23	25	26	27	28	30	31	32
30	21	23	22	23	24	26	27	28	29	31	32	33
31	22	24	23	24	25	27	28	29	30	32	33	34

A TABLE answering to any of the foregoing Numbers.

Num- bers.	Times answering	
	H.	M.
11	0	48
12	1	36
13	2	24
14	3	12
15	4	00
16	4	48
17	5	36
18	6	24
19	7	12
20	8	00
21	8	48
22	9	36
23	10	24
24	11	12
25	12	00
Afternoon		
26	0	48
27	1	36
28	2	24
29	3	12
30	4	00
31	4	48
32	5	36
33	6	24
34	7	12
35	8	00
36	8	48
37	9	36
38	10	24
39	11	12
40	12	00
After Midnight		



The Use of the foregoing Tables of Numbers.

IN these Tables, each Page is divided into two Parts, by a black Line drawn down the Middle; and each of the Parts are marked at the Top with the Year for which they shew the Numbers; and under that, the Left-Hand Column of each Part is marked with the Days of the Month, and the other Columns with the Months of the Year: So that if you would know the Number for any Day, suppose, for Example, on the 26th of March, 1780.

First, Find the given Year 1780, at the Top of the Table, and then under the given Month, which is *March*, and right against the given Day of the Month (which in this Case is 30) you will find the Number 30, which is the Number for that Day; and if from the Number so found you subtract 10, the Remainder will be 20, the Moon's Age for that Day.

The Use of the Table of the Times, answering to the foregoing Numbers.

In this Table the Left-hand Column is marked with the given Numbers from 11 to 40, and the Figures right against any of these Numbers, give the Time answering to it in Hours and Minutes.

E X A M P L E I.

I would know what Time answers to the Number 23?

Answer. 10 Hours 24 Minutes Afternoon, that is, at 24 Minutes past 10 at Night.

E X A M P L E II.

What Number and Time answers to the 30th of January, 1780.

First, By the Tables of Numbers, I find the Numbers to be 33, and against that Number, in the Table of Times, I find 6 Hours 24 Minutes after Midnight, that is, at 24 Minutes past Six in the Morning.

At

A		H	M			H	M
At <i>Army</i> —————		01	03	At <i>Cork, Calis, Cape Clear,</i>			
At <i>Amsterdam</i> and <i>Armentie</i>		03	00	and in the <i>Creek</i> —————		04	30
At <i>Abarwark</i> —————		04	30	At <i>Caldy</i> and <i>Comarthen Bay</i>		05	15
At <i>Abermorick</i> and <i>Antwerk</i>		06	00	At <i>Concalo</i> —————		06	00
At <i>Aldborough</i> —————		09	45	Without the <i>Caskets</i> ———		08	15
B				Between the <i>Caskets</i> and			
At <i>Beachy, Blacktail,</i> and be-				<i>Guernsey,</i> before <i>Cromer,</i> at <i>Se-</i>			
fore the <i>Race of Blanquet</i> ———		12	00	<i>ven Cliffs,</i> and at <i>Catness</i> ———		09	00
Thwart of <i>Beachy</i> —————		00	45	At the <i>Caskets</i> and at <i>Cham-</i>			
At <i>Blackness,</i> in <i>Bluet,</i> and at				<i>berness</i> —————		09	45
<i>Bell-Isle.</i> —————		1	30	At <i>Cows,</i> in the <i>Foss</i> of <i>Caen,</i>			
Without <i>Bluet,</i> and at <i>Ber-</i>				in <i>Calice</i> and <i>Chamberness</i> <i>Roads</i>		10	30
<i>wick.</i> —————		02	15	Before the <i>Haven</i> of <i>Caen,</i>			
<i>Bordeaux</i> <i>River,</i> the <i>South</i>				in the <i>Chamber,</i> between <i>Cripple</i>			
<i>Coast</i> of <i>Bretaigne,</i> the <i>Coast</i> of				<i>Sand,</i> and the <i>Croyle,</i> and at			
<i>Biscay,</i> and at <i>Backness</i> ———		03	00	<i>Calshot</i> —————		11	15
At <i>Brest,</i> before the <i>Base,</i>				<i>Charleston Bar.</i>		7	30
and the <i>River</i> of <i>Bordeaux</i>				D			
within the <i>Haven.</i>		03	45	At <i>Dover</i> <i>Pier,</i> and before			
In <i>Breesound, Bloy,</i> and <i>Bal-</i>				<i>Dunkirk</i> —————		12	00
<i>timore.</i> —————		04	30	At <i>Denbeigh,</i> and at <i>Downs</i>			
Before <i>Bremen</i> and at <i>Black-</i>				<i>Road</i> —————		02	15
<i>ney,</i> and in the <i>Channel</i> before				At <i>Dort</i> —————		03	00
<i>Bordeaux</i> —————		06	00	At <i>Dungarven</i> —————		04	30
At <i>Bristol</i> <i>Key</i> —————		06	45	At <i>Dartmouth</i> —————		06	00
At <i>Bridgewater</i> —————		07	30	At <i>Dublin</i> —————		10	00
<i>Bullen</i> <i>Deep</i> —————		10	30	At <i>Dunbar</i> —————		09	00
C				At <i>Dungeness</i> and <i>Dunnose</i> —		09	45
In <i>Condada</i> —————		12	00	At <i>Dover, Dieppe,</i> and <i>Deal</i>		10	30
In the <i>Chamber</i> of <i>Rye</i> ———		00	45	E			
Without <i>Calis,</i> at <i>Corpus</i>				At <i>Embsen,</i> before the <i>Elve,</i>			
<i>Christi</i> <i>Point,</i> and at <i>Camfer</i> —		01	30	before the <i>Eyder,</i> and before			
Between <i>Calis</i> and <i>Dover,</i>				<i>Enchusen</i> —————		12	00
before <i>Conquet,</i> and at the				At <i>Edam</i> —————		01	30
<i>North</i> <i>Cape</i> —————		03	00	Before the <i>Eastern</i> and <i>Wef-</i>			
				<i>tern Emes,</i> and at <i>Engomonts</i> —		09	00



A T I D E - T A B L E.

81

F	H	M		H	M
On the Coast of <i>Flanders</i> —	12	00	Under <i>Holy Island</i> , & at <i>Horn</i>	01	30
At <i>Flushing</i> —	00	45	Before <i>Hartleposle</i> —	03	00
Before the <i>Fen</i> in the Chan-			At <i>Huntcliff Foot</i> —	03	45
el —	01	30	At <i>Humber</i> —	05	15
Without <i>Fountny</i> —	02	15	Before <i>Hamborough</i> at <i>Hull</i> ,		
Without the Banks of <i>Flan-</i>			at the <i>Holmes</i> , and before <i>Hum</i>		
ers —	03	00	ber's Mouth —	06	00
At <i>Flamborough</i> and <i>Bridling-</i>			At <i>Haerlem</i> , <i>Havre de Grace</i> ,		
on —	04	30	and <i>Home Head</i> —	09	00
At the <i>Forn</i> , in <i>Foy</i> , at <i>Fal-</i>			At <i>St. Helens</i> and <i>Harwich</i> ,		
nouth —	05	15	and without the Banks of <i>Har</i>		
Between <i>Foy</i> & <i>Falmouth</i> , in			<i>wich</i> —	10	30
the Channel, and at <i>Foulness</i> —	06	45	At <i>Harwich</i> within —	11	15
Before the Coast of <i>Frieze-</i>					
and, and the <i>Fly</i> —	07	30	I		
Without the <i>Fly</i> —	08	15	At <i>Jutland Islands</i> —	12	00
At <i>Freize</i> and <i>Fair Isle</i> —	09	00	On the West Coast of <i>Ireland</i>	03	0
At the <i>Fritb</i> and South <i>Fore</i>			In all the Havens on the S.		
land —	10	30	Coast of <i>Ireland</i> —	05	15
In <i>Fair Isle Road</i> , and at the					
North <i>Foreland</i> —	11	15	K		
			<i>Kentish Knock</i> —	12	00
G			At <i>Kelliers</i> —	03	00
In <i>Gibraltar Road</i> , <i>Gravel-</i>			At <i>Kingsale</i> —	04	30
ling, and before <i>Cherburg</i> —	12	00	At <i>Kilduyn</i> —	07	30
Before <i>Goree</i> , at <i>Guernsey</i> , &			At <i>Kildive</i> —	09	00
at <i>Gravesend</i> —	01	30			
At <i>Groine</i> , at <i>Gascoign</i> , and			L		
the Coast of <i>Galicia</i> —	03	00	At <i>Leith</i> —	12	00
Thwart of <i>Guernsey</i> —	09	45	At <i>Lisbon</i> —	02	15
In the <i>Chamber</i> , and <i>Goree</i>			At <i>London</i> —	03	00
End —	11	15	Thwart of <i>Lundey</i> , and be-		
H			fore <i>Lynn</i> —	05	15
Before the <i>Hever</i> , before			At <i>Lynn Half-tide</i> , at <i>Lun-</i>		
<i>Horn</i> , and at <i>Hampton Key</i> —	12	00	dey —	06	00
			At <i>Lynn</i> —	06	45
			M		

	H	M		H	M
At the <i>Lizard</i> by the Land	07	30	At <i>Orkness</i> _____	03	00
At <i>Lambay</i> _____	08	15	At <i>Orkney</i> _____	09	00
At <i>Leystoft</i> , and thwart of it			At <i>Orfordness</i> within the	02	45
without the Banks _____	09	45	Banks, & between <i>Orford</i> and		
In <i>Leystoft</i> Road, and at <i>Long</i>			<i>Orwell Wales</i> _____	10	30
<i>Sand Head</i> _____	10	30	At <i>Orfordness</i> without the		
			Sands _____	11	15
M			P		
Within the <i>Maes</i> at <i>Mal-</i>			At <i>Portsmouth</i> Half-tide —	11	15
<i>don</i> _____	00	45	At the <i>Pens</i> , <i>Porthus</i> , and		
Before the <i>Maes</i> _____	01	30	<i>Poëtu</i> _____	03	00
At the <i>Maes</i> , and before <i>St</i>			On the Coast of <i>Portugal</i> —	03	45
<i>Matthew's Point</i> _____	03	45	In <i>Plymouth</i> , and before <i>St.</i>		
In the <i>Mouse-hole</i> , at <i>St. Mat-</i>			<i>Paul's</i> _____	05	15
<i>thew's</i> , and within <i>Mount's-bay</i>	04	30	In the Haven at <i>St. Paul's</i> —	06	00
In <i>Milford</i> , at <i>Moonless</i> , and			Before <i>Poddeffemeck</i> _____	06	45
at <i>St. Maloes</i> _____	05	15	Thwart of <i>Plymouth</i> _____	07	30
Between <i>Mouse-hole</i> and <i>Fal-</i>			At the Race of <i>Portland</i> —	09	00
<i>mouth</i> , and in <i>Milford-Haven</i> —	07	30			
In <i>St. Magnes Sound</i> , and			Q		
<i>Magnes Castle</i> _____	08	15	At <i>Queenborough</i> _____	12	00
At the <i>Ile of Man</i> _____	09	00			
Before <i>Margate</i> _____	11	15	R		
			At <i>Rocheſter</i> _____	00	45
N			At <i>Ramkins</i> _____	01	30
At <i>Newport</i> Half-tide _____	12	00	At <i>Rotterdam</i> , in <i>Robin Hood's</i>		
At the West End of the <i>Nore</i>	00	45	Bay, and from the Race to the		
Before <i>Nantz River</i> _____	03	00	<i>Pole Head</i> _____	03	00
At <i>Newcastle</i> _____	05	15	At <i>Rouen</i> and before <i>Rockel</i>	03	45
Before <i>St. Nicholas</i> _____	06	45	In <i>Ramsay</i> _____	05	15
At the <i>Needles</i> , at the <i>Ile of</i>			S		
<i>Wight</i> _____	08	15	In the <i>Sleeve</i> , between <i>Uſhant</i>		
All the Coast of <i>Normandy</i>			and <i>Scilly</i> , at the <i>Shoe</i> , at the		
and <i>Picardy</i> _____	10	30	<i>Spitts</i> , at <i>Southampton</i> , and along		
Between the <i>Naze</i> and <i>War-</i>			the <i>Swin</i> _____	12	00
head of <i>Lower</i> _____	11	15			
			Upon		

A T I D E - T A B L E.

83

	H	M		H	M
Upon the Coast of Spain, and in Shetland —————	03	00	Without Ushant —————	06	00
At Scilly, in the Sound, Scar- burgh, and at Staples —————	03	45	St. Vallery —————	10	30
At Seven-Isles, without the Haven in the Broad Sound ———	04	30	W		
At the Mouth of the Severn, between Scilly and the Lizard			At Winchelfey —————	00	45
at the Spurn and Stockton ———	05	15	At the Weilings, and from the West-end of the Wight ———	01	30
Without Scilly, in the Chan- nel, and at Salcomb —————	06	00	Before the Weilings —————	02	15
At Sedmouth, and at the Start	06	45	At Whitby —————	03	10
Off the Start in the Channel	07	30	In the Sea of Wales and Severn —————	04	30
Within the Seyn, and before			In Wales —————	05	15
Shelburgh —————	09	00	At Wales, at Weymouth, and at Waterford —————	06	00
At Shoreham —————	09	45	At Weymouth Key —————	06	45
At Seyn-Head —————	10	30	At the Nefs, by Wieringhen at Winterton —————	07	30
T			Thwart of the Isle of Wight in the Channel, all within the Wight, between the Wight and Beachy by the Shore ———	08	15
Within Tervere —————	00	45	At the E. end of the Wight, and on Wieringhen-Flats ———	09	00
Before Tervere, before the Thames, and at Tinmouth ———	01	30	Wexford —————	6	0
Before the Tees & Tinmouth, before the Bay of Tinmouth ———	03	00	Y		
At the Clifts of the Texell ———	04	30	Before Yarmouth —————	01	30
In Torbay, and before the Texell —————	06	00	At Youghall —————	04	30
In the Road of the Texell ———	07	30	At Yarmouth —————	08	15
At Torgen —————	09	45	In Yarmouth Roads, and Yar- mouth Haven —————	10	30
U			Z		
Before Ureck —————	12	00	On the Coast of Zealand ———	01	30
At Use —————	03	00	In the Zerick-Sea —————	03	00
Between Ushant and the Main	03	45			
In the Vourde, at the Bay within Ushant —————	04	30	M 2	The	

The Use of the TIDE-TABLE, in finding the Time of High-Water.

IN this Table the Names of the Places being set in alphabetical Order, they will always be found under the Letter they begin with, as for Example, *London* will be found under the Letter L; *Torbay* under T; *Scilly* under S, &c. and the Figures right against any Place, shews the Time of High-water at that Place on the Full and Change of the Moon.

Then if it be required to find the Time of High-water at any Place upon any given Day, First, (by the Tables of Numbers and Times answering) find the Number and Times answering for that Day, (as before taught) and to that Time add the Hours and Minutes that stand in the Tide Table against the Place you would know the Time of High-water at, the Sum, if it doth not exceed 12 Hours, will be the Time of High-water required; but if it should be more than 12 Hours, then subtract 12 from it, and the Remainder will be the Time of High-water.

E X A M P L E I.

Suppose it was required to find the Time of High-Water at London, on the 21st of May, 1781.

By the Tables of Numbers I find the Number for the 21st of May, to be 38, with which Number entering the Tables of Times, I find the Time answering to be 10 H. 24 M. then looking for *London* in the Tide Table, I find against it 3 Hours, which added to the Time before found, gives 13 Hours 24 Min. from which subtract 12, and the Remainder 1 H. 24 M. is the Time of High-water at *London* on the 21st of May, 1781, in the Morning.

E X A M P L E II.

Suppose it was required to find the Time of High Water at St. Helen's, on the 25th of April, 1782.

Look in the Tables as before directed, and you will find the Number answering to be 22, and against Number 22 in the Table of Times, is 9 H. 36 M. I then look for *Helen's* in the Tide Table, against which I find 10 H. 30 M. which added to the Time above found, gives 20 H. 6 M. from which subtract 12 H. and the Remainder 8 H. 6 M. is the Time of High Water next Morning, viz. on the 26th Day in the Morning.

A T A B L E of the Sun's Declination for the Years 1780, 1784, 1788, and 1792.

M. Day	January	February	March	April	May	June	July	August	Sept.	October	Nov.	Dec.
	South	South	South	North	North	North	North	North	North	South	South	South
1	23 3	17 11	7 18	4 49	15 18	12 10	23 7	17 55	8 5	3 27	14 41	21 58
2	22 58	16 54	6 55	5 12	15 36	22 18	23 2	17 39	7 43	3 50	15 0	22 7
3	22 53	16 36	6 32	5 35	15 53	22 25	22 58	17 24	7 21	4 13	15 19	22 15
4	22 47	16 18	6 9	5 58	16 10	22 32	22 52	17 7	6 59	4 37	15 38	22 23
5	22 40	16 0	5 46	6 21	16 28	22 39	22 47	16 51	6 36	5 0	15 56	22 31
6	22 33	15 42	5 23	6 44	16 44	22 45	22 41	16 35	6 14	5 23	16 14	22 38
7	22 26	15 23	4 59	7 6	17 1	21 51	22 34	16 18	5 51	5 46	16 32	22 44
8	22 18	15 5	4 36	7 28	17 17	22 56	22 27	16 1	5 29	6 9	16 49	22 50
9	22 10	14 45	4 12	7 51	17 33	23 1	22 20	15 43	5 6	6 32	17 6	22 56
10	22 1	14 26	3 49	8 13	17 49	23 6	22 12	15 26	4 43	6 55	17 23	23 1
11	21 52	14 6	3 25	8 35	18 4	23 10	22 4	15 8	4 20	7 17	17 40	23 6
12	21 43	13 47	3 2	8 57	18 19	23 14	21 56	14 50	3 57	7 40	17 56	23 11
1	21 33	13 27	2 38	9 18	18 34	23 17	21 47	14 31	3 34	8 2	18 12	23 15
14	21 22	13 6	2 14	9 40	18 48	23 20	21 38	14 13	3 11	8 25	18 27	23 18
15	21 11	12 46	1 51	10 1	19 3	23 22	21 29	13 54	2 48	8 47	18 42	23 21
16	21 0	12 25	1 27	10 23	19 16	23 25	21 19	13 35	2 24	9 9	18 58	23 23
17	20 49	12 4	1 3	10 44	19 30	23 26	21 9	13 16	2 1	9 31	19 12	23 26
18	20 37	11 43	0 40	11 5	19 43	23 28	20 58	12 56	1 38	9 53	19 26	23 27
19	20 24	11 22	0 16	11 25	19 56	23 28	20 47	12 37	1 14	10 15	19 40	23 28
20	20 12	11 1	0 N8	11 46	20 8	23 28	20 36	12 17	0 51	10 36	19 54	23 29
21	19 58	10 39	0 32	12 6	20 20	23 29	20 24	11 57	0 28	10 58	20 7	23 29
22	19 45	10 17	0 55	12 26	20 32	23 29	20 12	11 36	0 4	11 19	20 20	23 29
23	19 31	9 55	1 19	12 46	20 44	23 28	20 0	11 16	0 S19	11 40	20 32	23 28
24	19 17	9 33	1 42	13 6	20 55	23 27	19 47	10 56	0 43	12 1	20 44	23 27
25	19 2	9 11	2 6	13 25	21 5	23 25	19 34	10 35	1 6	12 22	20 56	23 25
26	18 47	8 49	2 29	13 45	21 16	23 23	19 21	10 14	1 30	12 42	21 7	23 23
27	18 32	8 26	2 53	14 4	21 26	23 21	19 7	9 53	1 53	13 3	21 18	23 20
28	18 16	8 4	3 16	14 23	21 35	23 18	18 50	9 31	2 17	13 23	21 29	23 17
29	18 1	7 41	3 40	14 41	21 45	23 15	18 36	9 10	2 40	13 43	21 39	23 13
30	17 44		4 3	15 0	21 54	23 11	18 21	8 48	3 33	14 3	21 49	23 9
31	17 28		4 26		21 2		18 10	8 27		14 22		23 5

A T A B L E of the Sun's Declination for the Years 1781, 1785, 1789, and 1793.

M. Day	January	February	March	April	May	June	July	August	Sept.	October	Nov.	Dec.
	South	South	South	North	North	North	North	North	North	South	South	South
1	22 58	16 55	7 41	4 52	15 15	22 8	23 6	17 55	8 7	3 24	14 38	21 56
2	22 53	16 38	6 58	5 15	15 33	22 16	23 2	17 40	7 45	3 45	14 57	22 5
3	22 47	16 20	6 35	5 33	15 50	22 24	22 57	17 24	7 23	4 13	15 16	22 13
4	22 40	16 2	6 12	5 55	16 8	22 31	22 52	17 8	6 0	4 34	15 35	22 21
5	22 33	15 44	5 48	6 18	16 25	22 37	22 46	16 52	6 38	4 57	15 53	22 29
6	22 20	15 25	5 25	6 49	16 42	22 43	22 40	16 35	6 16	5 20	16 11	22 30
7	22 18	15 6	5 2	7 3	16 58	22 49	22 34	16 19	5 53	5 43	16 29	22 42
8	22 10	14 47	4 39	7 27	17 15	22 55	22 27	16 2	5 31	6 6	16 46	22 49
9	22 1	14 28	4 15	7 48	17 30	22 0	22 20	15 44	5 8	6 29	17 3	22 54
10	21 53	14 8	3 52	8 10	17 46	23 4	22 12	15 27	4 45	6 52	17 20	23 0
11	21 43	13 49	3 28	8 32	18 2	23 8	22 4	15 9	4 22	7 10	17 37	23 5
12	21 33	13 29	3 4	8 54	18 17	23 12	21 56	14 51	3 59	7 37	17 55	23 9
13	21 23	13 8	2 41	9 18	18 31	23 16	21 47	14 29	3 36	8 0	18 9	23 13
14	21 12	12 48	2 17	9 37	18 46	23 19	21 38	14 14	3 13	8 26	18 25	23 17
15	21 1	12 27	1 54	9 58	19 0	23 21	21 29	13 54	2 50	8 47	18 40	23 20
16	20 49	12 6	1 30	10 20	19 14	23 23	21 19	13 36	2 27	9 6	18 55	23 22
17	20 37	11 45	1 6	10 41	19 27	23 25	21 9	13 17	2 3	9 28	19 11	23 24
18	20 25	11 24	0 42	11 2	19 41	23 26	20 58	12 58	1 40	9 50	19 24	23 26
19	20 12	11 3	0 19	11 22	19 58	23 27	20 47	12 38	1 17	10 12	19 38	23 27
20	19 59	10 41	N 5	11 43	20 6	23 28	20 26	12 18	0 53	10 34	19 51	23 28
21	19 46	10 20	0 29	12 3	20 18	23 28	20 24	11 58	0 7	10 55	20 5	23 28
22	19 32	9 58	0 52	12 23	20 30	23 28	20 13	11 38	0 51	11 19	20 17	23 28
23	19 18	9 38	1 16	12 43	20 42	23 27	20 0	11 18	0 40	11 39	20 30	23 27
24	19 3	9 13	1 39	13 3	20 53	23 26	19 48	10 57	1 4	11 50	20 42	23 26
25	18 48	8 51	2 3	13 23	21 3	23 24	19 35	10 36	1 20	12 19	20 54	23 24
26	18 33	8 29	2 26	13 42	21 14	23 22	19 21	10 15	1 27	12 39	21 5	23 22
27	18 18	8 6	2 50	14 1	21 24	23 20	19 8	9 54	1 51	13 0	21 16	23 19
28	18 2	7 43	3 13	14 20	21 35	23 17	18 54	9 33	2 13	13 20	21 27	23 16
29	17 45		3 37	14 38	21 43	23 14	18 40	9 12	2 37	13 44	21 37	23 13
30	17 29		4 0	14 57	21 52	23 10	18 25	8 50	3 1	14 0	21 46	23 9
31	17 13		4 23		22 20		18 10	8 29		14 19		23 4

A T A B L E of the Sun's Declination for the Years 1782 1786, 1790 and 1794.

M. Day	January	February	March	April	May	June	July	Augst	Sept.	October	Nov.	Dec.
	South	South	South	North	North	North	North	North	North	South	South	South
1	23 0	17 0	7 28	4 39	15 10	22 6	23 8	18 c	8 13	3 17	14 33	21 55
2	22 55	16 43	7 5	5 2	15 28	22 14	23 4	17 45	7 51	3 40	14 52	22 2
3	22 49	16 25	6 42	5 25	15 45	22 22	22 59	17 29	7 29	4 4	15 11	22 11
4	22 42	16 8	6 19	5 48	16 3	22 29	22 54	17 13	7 7	4 27	15 20	22 19
5	22 36	15 49	5 56	6 11	16 20	22 36	22 48	16 57	6 45	4 50	15 48	22 27
6	22 29	15 31	5 32	6 34	16 37	22 42	22 42	16 41	6 23	5 13	16 6	22 34
7	22 21	15 12	5 9	6 56	16 53	22 48	22 36	16 24	6 0	5 36	16 24	22 41
8	22 13	14 53	4 46	7 19	17 10	22 53	22 29	16 7	5 37	5 59	16 41	22 47
9	22 4	14 34	4 22	7 41	17 26	22 59	22 22	15 50	5 15	6 22	16 58	22 53
10	22 53	14 14	3 59	8 3	17 42	23 3	22 15	15 32	4 52	6 41	17 15	22 59
11	21 46	13 55	3 35	8 25	17 57	23 8	22 7	15 15	4 29	7 8	17 32	23 4
12	21 36	13 35	3 12	8 47	18 12	23 12	21 59	14 57	4 26	7 30	17 48	23 8
13	21 26	13 15	2 48	9 9	18 27	23 15	21 53	14 38	3 6	7 53	18 4	23 12
14	21 16	12 54	2 24	9 31	18 42	23 18	21 41	14 20	3 43	8 15	18 20	23 16
15	21 5	12 34	2 1	9 52	18 56	23 21	21 32	14 1	2 20	8 38	18 36	23 19
16	20 58	12 14	1 37	10 13	19 10	23 23	21 22	13 42	2 57	9 0	18 51	23 22
17	20 41	11 52	1 13	10 34	19 24	23 25	21 12	13 23	2 34	9 22	19 5	23 24
18	20 29	11 31	0 50	10 55	19 37	23 26	21 2	13 4	1 11	9 44	19 20	23 26
19	20 16	11 9	0 26	11 16	19 50	23 27	20 51	12 44	1 47	10 6	19 34	23 27
20	20 4	10 48	0 2	11 37	20 3	23 28	20 40	12 24	1 24	10 27	19 48	23 28
21	19 50	10 26	N 21	11 57	20 15	23 28	20 28	12 4	0 01	10 49	20 1	23 28
22	19 36	10 4	0 45	12 17	20 27	23 28	20 16	11 44	0 37	11 10	20 14	23 28
23	19 22	9 42	1 9	12 37	20 38	23 28	20 4	11 24	0 51	11 31	20 27	23 28
24	19 8	9 20	1 32	12 57	20 50	23 27	19 52	11 3	0 10	11 52	20 39	23 27
25	18 53	8 58	1 56	13 17	21 0	23 25	19 39	10 43	0 33	12 13	20 51	23 25
26	18 38	8 36	2 19	13 36	21 11	23 23	19 26	10 22	1 20	12 34	21 2	23 23
27	18 23	8 13	2 43	13 56	21 21	23 21	19 12	10 1	1 44	12 54	21 13	23 21
28	18 7	7 50	3 6	14 14	21 31	23 18	18 59	9 40	2 7	13 14	21 24	23 18
29	17 51		3 30	14 33	21 40	23 15	18 44	9 18	2 30	13 34	21 34	23 14
30	17 34		3 53	14 51	21 49	23 12	18 30	8 57	2 54	13 54	21 44	23 10
31	17 17		4 16		21 58		18 15	8 35		14 13		23 6

A T A B L E of the Sun's Declination for the Years 1783 1787, 1791 and 1795.

M. Day	January	February	March	April	May	June	July	August	Sept.	October	Nov.	Dec.
	South	South	South	North	North	North	North	North	North	South	South	South
1	23 1	17 3	7 31	4 36	15 7	22 5	23 8	18 2	8 17	3 14	14 30	21 52
2	22 55	16 46	7 8	4 59	15 25	22 13	23 4	17 47	7 55	3 37	14 49	22 1
3	22 45	16 28	6 45	5 22	15 43	22 20	22 59	17 31	7 33	3 0	15 8	22 9
4	22 43	16 10	6 22	5 48	16 0	22 28	22 54	17 16	7 11	4 24	15 26	22 18
5	22 37	15 52	5 59	6 8	16 17	22 34	22 49	16 59	6 48	4 47	15 45	22 25
6	22 30	15 34	5 36	6 30	16 34	22 41	22 43	16 43	6 26	5 10	16 3	22 33
7	22 22	15 15	5 13	6 53	16 51	22 47	22 37	16 26	6 3	5 33	16 21	22 40
8	22 14	14 56	4 49	7 15	17 7	22 52	22 30	16 9	5 41	5 56	16 31	22 46
9	22 6	14 37	4 26	7 38	17 23	22 58	22 23	15 52	5 18	6 19	16 56	22 52
10	21 57	14 17	4 2	8 0	17 39	23 2	22 16	15 35	4 55	6 42	17 13	22 58
11	21 47	13 58	3 39	8 22	17 55	23 7	22 8	15 17	4 32	7 4	17 29	23 3
12	21 38	13 38	3 15	8 44	18 10	23 11	22 0	14 59	4 10	7 27	17 46	23 7
13	21 28	13 18	2 52	9 6	18 25	23 14	21 51	14 41	3 47	7 50	18 2	23 11
14	21 17	12 57	2 28	9 28	18 40	23 17	21 42	14 22	3 23	8 12	18 18	23 15
15	21 6	12 37	2 4	9 49	18 54	23 20	21 33	14 4	3 0	8 35	18 33	23 18
16	20 20	12 16	1 41	10 0	19 8	23 23	21 33	13 45	2 37	8 57	18 48	23 21
17	20 55	11 55	1 17	10 31	19 22	23 25	21 13	13 26	2 14	9 19	19 3	23 24
18	20 43	11 34	0 53	10 52	19 35	23 26	21 3	13 6	1 51	9 40	19 18	23 25
19	20 31	11 13	0 30	11 13	19 48	23 27	20 52	12 47	1 27	10 2	19 32	23 27
20	20 18	10 51	0 6	11 34	20 1	23 28	20 41	12 28	1 4	10 24	19 45	23 28
21	19 5	10 30	0 N 18	11 54	20 13	23 28	20 30	12 7	0 41	10 45	19 59	23 28
22	19 52	10 8	0 42	12 14	20 25	23 28	20 18	11 47	0 17	11 7	20 12	23 28
23	19 38	9 46	1 5	12 34	20 36	23 27	20 6	11 27	0 8 6	11 28	20 25	23 28
24	19 24	9 24	1 20	12 54	20 48	23 26	19 53	11 6	0 30	11 49	20 37	23 27
25	18 10	9 1	1 52	13 14	20 59	23 25	19 41	10 46	0 53	12 10	20 49	23 25
26	18 55	8 39	2 14	13 33	21 9	23 23	19 28	10 25	1 17	12 30	21 0	23 23
27	18 40	8 16	2 39	13 52	21 19	23 21	19 14	10 4	1 40	12 51	21 10	23 21
28	18 25	7 54	3 3	14 10	21 29	23 19	19 0	9 43	2 3	13 11	21 22	23 18
29	17 9		3 37	14 30	21 39	23 16	18 46	9 21	2 27	13 31	21 32	23 15
30	17 53		3 50	14 49	21 48	23 12	18 32	9 0	2 50	13 51	21 42	23 11
31	17 20		4 13		21 57	23 0	18 17	8 38		14 10		23 7

A TABLE of the Variation of the Sun's Declination to every 10 Degrees of Longitude.

Degrees of Longitude from the Meridian of LONDON.

Daily Vari.	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
Min.	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
2	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
3	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
4	0	0	0	0	1	1	1	1	1	1	1	1	1	2	2	2	2	2
5	0	0	0	0	1	1	1	1	1	1	1	2	2	2	2	2	2	2
6	0	0	0	1	1	1	1	1	1	2	2	2	2	2	2	2	3	3
7	0	0	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3
8	0	0	1	1	1	1	1	2	2	2	2	3	3	3	3	3	4	4
9	0	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4
10	0	1	1	1	1	2	2	2	3	3	3	3	4	4	4	5	5	5
11	0	1	1	1	2	2	2	3	3	3	3	4	4	4	5	5	5	5
12	0	1	1	1	2	2	2	3	3	3	4	4	4	5	5	5	6	6
13	0	1	1	1	2	2	2	3	3	4	4	4	5	5	5	6	6	6
14	0	1	1	2	2	2	3	3	3	4	4	5	5	5	6	6	7	7
15	0	1	1	2	2	3	3	3	4	4	5	5	5	6	6	7	7	7
16	0	1	1	2	2	3	3	4	4	5	5	5	6	6	7	7	8	8
17	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	8
18	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	9	9
19	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	9	9
20	1	1	2	2	3	3	4	4	5	6	6	7	7	8	8	9	9	10
21	1	1	2	2	3	4	4	5	5	6	6	7	8	8	9	9	10	10
22	1	1	2	2	3	4	4	5	6	6	7	7	8	9	9	10	10	11
23	1	1	2	3	3	4	4	5	6	6	7	8	8	9	10	10	11	11
24	1	1	2	3	3	4	4	5	6	7	7	8	9	9	10	11	11	12

N

To

To find the Sun's Declination by the foregoing T A B L E S.

EACH Page of the foregoing Tables contains the Sun's Declination for the four Years that it is marked with at the Top, and is divided into thirteen Columns; the first of which to the Left-Hand, shews the Day of the Month, and the other Twelve the Months of the Year, so that if it be required to find the Sun's Declination for any Day, as suppose for Example, on the 21st of *August*, 1780: First, I look for that Table that has 1780, at the Top of it, and then right against the 21st Day of the Month, and under *August*, I find 11 57, which shews the Sun's Declination to be 11 Degrees 57 Minutes North; according to the Title at the Top of the Column.

The Sun's Declination in these Tables being calculated for the Meridian of *London*, if you should be considerably to the Eastward, or to the Westward of *London*, it will cause some Alteration in it; to correct which, the

Table of Variation of the Sun's Declination is to be used, as follows:

First, Look out the Declination for the given Day of the Month, and for the Day following it, and subtract the less from the greater, the Remainder is the daily Variation.

Second, Observe whether the Declination be increasing or decreasing, which you may know thus; if the Declination for the Day following the given Day be biggest, then it is increasing; but if it be least, it is decreasing.

Third, Look for the daily Variation in the first Column of the Table, and see what Number stands right against it, and under the given Degrees of Longitude, which Number is to be used as follows.

If the Difference of Longitude be Easterly, and the Declination increasing, it must be subtracted from the Declination found in the Tables for the given Day; but if the Declination be decreasing, it must be added.

If the Difference of Longitude be Westerly, and the Declination increasing, it must be added; but if the Declination be decreasing, it must be subtracted; the Sum in one Case, and the Remainder in the other will be the Sun's Declination at Noon in the Longitude required.

A T A B L E of the Sun's Right Ascension.

Month Day	January		February		March		April		May		June		July		August		September		October		November		December	
	H	M	H	M	H	M	H	M	H	M	H	M	H	M	H	M	H	M	H	M	H	M	H	M
1	18	50	21	02	22	51	00	44	02	35	04	38	06	42	08	47	10	43	12	31	14	28	16	32
2	18	54	21	06	22	54	00	48	02	39	04	42	06	46	08	51	10	47	12	35	14	31	16	36
3	18	58	21	10	22	58	00	51	02	43	04	46	06	50	08	55	10	50	12	38	14	35	16	40
4	19	03	21	14	23	02	00	55	02	47	04	50	06	55	08	59	10	54	12	42	14	39	16	45
5	9	07	21	18	23	05	00	59	02	51	04	54	06	59	08	02	10	57	12	46	14	43	16	49
6	19	12	21	22	23	09	01	02	02	54	04	58	07	03	09	06	11	01	12	49	14	47	16	53
7	19	16	21	26	23	13	01	06	02	58	05	03	07	07	09	10	11	05	12	53	14	51	16	58
8	19	20	21	30	23	16	01	10	03	02	05	07	07	11	09	14	11	08	12	57	14	55	17	02
9	19	25	21	34	23	20	01	13	03	06	05	11	07	15	09	18	11	12	13	00	14	59	17	07
10	19	29	21	38	23	24	01	17	03	10	05	15	07	19	09	21	11	16	13	04	15	03	17	11
11	19	33	21	42	23	28	01	21	03	14	05	19	07	23	09	25	11	19	13	08	15	07	7	15
12	19	38	21	46	23	31	01	24	03	18	05	23	07	27	09	29	11	23	13	11	15	12	17	20
13	19	42	21	50	23	35	01	28	03	22	05	27	07	31	09	33	11	26	13	15	15	16	17	24
14	19	46	21	53	23	39	01	32	03	26	05	32	07	36	09	37	11	30	13	19	15	20	17	29
15	19	51	21	57	23	42	01	35	03	3	05	36	07	40	09	40	11	33	13	23	15	24	17	33
16	19	55	22	01	23	46	01	39	03	34	05	40	07	44	09	44	11	37	13	26	15	28	17	38
17	19	59	22	05	23	49	01	43	03	38	05	44	07	48	09	48	11	41	13	30	15	32	17	42
18	20	04	22	09	23	53	01	46	03	41	05	48	07	52	09	52	11	44	13	34	15	36	17	46
19	20	08	22	13	23	57	01	50	03	45	05	52	7	56	09	55	11	48	13	38	15	40	17	51
20	20	12	22	17	00	00	1	54	03	49	05	57	8	00	09	59	11	51	13	41	15	45	17	55
21	20	16	22	20	00	04	01	58	03	53	6	01	8	04	10	03	11	55	13	45	15	49	18	00
22	20	2	22	24	00	08	02	01	03	57	6	05	8	08	10	06	11	59	13	49	15	53	18	04
23	20	25	22	28	00	11	02	0	04	01	6	09	8	12	10	11	12	02	13	53	15	57	18	09
24	20	29	22	32	00	15	02	09	04	06	06	13	8	16	10	14	12	06	13	57	16	02	18	13
25	20	33	22	36	00	19	02	13	04	10	06	17	8	20	10	17	12	09	14	00	16	06	18	18
26	20	37	22	39	00	22	02	16	04	14	06	22	8	23	10	21	12	13	14	04	16	10	18	22
27	20	41	22	43	00	26	02	20	04	18	06	26	8	27	10	25	12	17	14	08	16	14	18	26
28	20	45	22	47	00	30	02	24	04	22	06	30	8	31	10	28	12	20	14	12	16	19	18	31
29	20	49			00	33	02	28	04	26	06	34	8	35	10	32	12	24	14	16	16	23	18	35
30	20	54			00	37	02	31	04	30	06	38	8	39	10	36	12	27	14	20	16	27	18	40
31	20	58			00	40			04	34			8	43	10	39			14	24			18	44

A T A B L E of the Right Ascension, in Time, and Declination of some of the most noted Fixed Stars.

The Names of the Stars.	Right Ascension		Declination.	
	H.	M.	D.	M.
<i>The Bright Star of Aries</i> —————	01	53	22	22N
<i>Medusa's Head, Algol</i> —————	02	52	39	59N
<i>The Bright Side of Perseus</i> —————	03	07	48	58N
<i>The Bull's Eye, Aldebaran</i> —————	04	22	16	01N
<i>The Goat Star, Capella</i> —————	04	59	45	44N
<i>The Bright Foot of Orion, Regel</i> —————	05	03	08	28S
<i>The Northern Horn of the Bull</i> —————	05	11	28	21N
<i>Orion's Right Shoulder</i> —————	05	10	06	04N
<i>The Southern Horn of the Bull</i> —————	05	21	20	5N
<i>Middle Star in Orion's Belt</i> —————	05	22	00	30S
<i>Orion's Left Shoulder</i> —————	05	52	07	20N
<i>Auriga's Right Shoulder</i> —————	05	44	44	54N
<i>Bright Foot of Gemini</i> —————	06	20	16	38N
<i>The Dog Star, Sirius</i> —————	06	34	16	23S
<i>Castor, or the Head of the Northern Twin</i> ———	07	20	32	24N
<i>The Little Dog Star, Procyon</i> —————	07	26	05	49N
<i>Pollux, or the Head of the Southermost Twin</i> ———	07	28	28	34N
<i>Hydra's Heart</i> —————	09	16	07	37S
<i>The Lyon's Heart, Regulus</i> —————	09	53	12	56N
<i>The Lower of the Pointers</i> —————	10	45	57	41N
<i>The Upper of the Points</i> —————	10	46	03	03N
<i>The Lyon's Tail, Deneb</i> —————	11	35	15	55N
<i>Upper of the two last in the square of Great Bear</i> ———	12	04	58	35N
<i>The first in the Great Bear's Tail</i> —————	12	41	57	18N
<i>The Virgin's Spike</i> —————	13	12	09	52S
<i>The middle of the three in Great Bear's Tail</i> ———	13	11	56	22N
<i>Last but one in the Tail of Hydra</i> —————	13	50	21	43S
<i>Last in the Great Bear's Tail</i> —————	13	36	50	31N
<i>Arcturus</i> —————	14	0	20	26N
<i>Bright Star in the Southern Balance</i> —————	14	35	14	53S
<i>Foremost Guard</i> —————	15	51	75	15N

A T A B L E of the Fixed Stars.

The Names of the Stars.	Right Ascension		Declina- tion.	
	H.	M.	D.	M.
<i>Bright Star of the Crown</i> —————	15	22	27	33N
<i>Bright Star in the Serpent's Neck</i> —————	15	31	07	18N
<i>The Scorpion's Heart, Antares</i> —————	16	41	25	51S
<i>The Head of Hercules</i> —————	17	03	14	40N
<i>In the Head of Serpentarius</i> —————	17	22	12	47N
<i>Bright Star in the Dragon's Head</i> —————	17	50	51	32N
<i>Lyra, or the Harp</i> —————	18	27	38	33N
<i>Swan's Beak</i> —————	19	17	27	29N
<i>Bright Star in the Eagle</i> —————	19	39	08	14N
<i>The Swan's Tail</i> —————	20	33	44	19N
<i>Pegasus's Mouth</i> —————	21	27	08	39N
<i>Fomelbaut</i> —————	22	42	30	55S
<i>Pegasus's Wing, Marchab</i> —————	22	53	13	53N
<i>Pegasus's Leg, Scheat</i> —————	22	52	26	43N
<i>Cephus's Knee</i> —————	23	20	76	07N
<i>The Head of Andromeda</i> —————	23	54	27	34N
<i>End of Pegasus's Wing, Algenib</i> —————	23	58	13	39N
<i>Pole Star</i> —————	00	42	88	00N
<i>Girdle of Andromeda</i> —————	00	53	34	05N

A T A B L E of the Right Ascension and Declination of the Crofiers.	Right Ascension		Declina- tion.	
	H.	M.	D.	M.
<i>The Westermof of the two middle Stars</i> —————	12	03	57	28S
<i>The Eastermost</i> —————	12	33	58	26S
<i>The Northermost or higheft Star</i> —————	12	18	55	30S
<i>The Southermost or loweft</i> —————	12	12	61	48S

To work an Observation, or to find the Latitude of the Place by the Tables of the Sun or Stars Declination, and their Zenith Distance, &c.

Note, **W**HEN you take an Observation of the Sun, by the common Sea Quadrant, the Degrees and Minutes that your Sight Vane stands at, being added to the Degrees that your Shade or Glass Vane stands at, will give the Zenith Distance (or Complement of the Meridian Altitude) with which, and the Declination found in the Tables, you may find the Latitude as follows :

First, Take Notice whether the Sun or Star be to the Northward or to the Southward of you at the Time of Observation ; if to the Northward, call your Zenith Distance North ; or if to the Southward, call it South. Then,

Second, If the Zenith Distance and Declination are both North, or both South, subtract the less from the greater, the Remainder will be the Latitude you are in, of the same Name with the Declination, if that be greater than the Zenith Distance, otherwise of a contrary Name.

Example 1st. Being at Sea on the 24th of *August*, 1781, I observed at Noon, and had on my Quadrant 8 40 (and the Sun to the Northward of me) what Latitude am I in ?

Zenith Distance	_____	8	40	North
Declination	_____	10	57	North

Latitude by Observation	_____	2	17	North
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Example 2d. Being at Sea on the 25th of *December*, I took the Altitude of the Log Star *Syrus*, on the Meridian to the Southward of me, 25d. I would know the Latitude ?

Note, In all Cases (except where the Object is observed on the Meridian below the Pole) if the Meridian Altitude be given instead of the Zenith Distance, (as it is in this Example) then subtract it from 90d. and the Remainder will be the Zenith Distance.

Meridian Altitude from 90d. leaves the Zen. Dist.	_____	65	00	South
Star's Declination (by the Table)	_____	16	23	South

Latitude by Observation	_____	48	37	North
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To

To work an Observation.

Case the 2d. If the Zenith Distance and Declination be one North and the other South, add them together, and their Sum will be the Latitude required, of the same Name with the Declination.

Example 1st. Being at Sea on the 3d of November, 1780, I observed at Noon, and had on my Quadrant 8 17, (and the Sun to the Northward of me) I demand the Latitude ?

Zenith Distance	_____	08	17	North
Declination	_____	15	19	South
Latitude by Observation	_____	23	36	South

Example 2d. Being at Sea on the 21st of June 1782, I took the Altitude of the Bright Star in the *Harp Lyrae*, (on the Meridian to the Southward of me) 51d. I demand the Latitude ?

Complement Altitude, or Zenith Distance	_____	39	00	South
Star's Declination, as by the Table	_____	38	33	North
Latitude by Observation	_____	77	33	North

The foregoing Rules are for observing by the Sun or Stars, when they are at their greatest Altitude, or upon the Meridian above the Pole; but as in some Parts of the Earth, the Sun does not set for several Days, and some Stars never set; in that Case they may be observed upon the Meridian, twice in the 24 Hours, that is, once at their greatest Height (as before) and again, when they are at the lowest, or upon the Meridian below the Pole; to work which Observation, take the following Rule.

Add the Complement of the Declination to the Meridian Altitude, the Sum is the Latitude of the same Name with the Declination.

Example. Being at Sea, I took the Altitude of the Pole Star on the Meridian below the Pole, 46 21. I demand the Latitude ?

Meridian Altitude	_____	46	21	
Complement Declination	_____	01	56	North
Latitude by Observation	_____	48	17	North

The

REMARKS by the Revisor.) The Author in the above Rules and Examples, takes the Sum of the Numbers found on his Quadrant, and works with it, as if true, to find the Latitude; but the Latitude so obtained will differ several Minutes from the true Latitude. For obtaining which, the Zenith Distance, as found by the Quadrant, must be corrected, as shewn in the MARINER'S COMPASS RECTIFIED.

The Use of the TABLES of the Sun's and Stars Right Ascension, in finding what Time any known Star will be upon the Meridian, on any given Day.

Rule, Look for the Right Ascension of the Sun and Star in the foregoing Tables, and subtract the Sun's Right Ascension from the Stars; but if the Sun's Right Ascension be greatest, add 24 Hours to the Stars Right Ascension, and then subtract the Sun's from it, the Remainder will be the Time of the Star's coming to the Meridian after Noon.

Example 1st. What Time will the *Lyon's Tail Deneb* be upon the Meridian on the 14th of *April*?

	h.	m.
Star's Right Ascension	11	35
Sun's Right Ascension	01	32
Time the Star will be on the Meridian	10	03 at Night.

Example 2d. What Time will the *Bull's Eye* be on the Meridian on the 26th of *October*?

Star's Right Ascension 4 h. 22m. add 24, makes	28	22
Sun's Right Ascension	14	04
Time the Star will be on the Meridian	14	18 That is, <i>October</i> 26th, at 14h. 18m. from Noon, or at 18m. past two in the Morning, of the 17th.

To find what Star will come upon the Meridian, at any given Time.

Rule, Add the Time from Noon, to the Right Ascension of the Sun, the Sum will be the Right Ascension of the Star required to be known, with which enter the Table of the Star's Right Ascension, and find what Star's Right Ascension agrees with, or comes the nearest to it, which is the Star required.

Example 1st. I would know what Star will be on the Meridian, about Eight at Night, on the 7th of *April*?

	h.	m.
Sun's Right Ascension	01	06
Time from Noon	08	00
Right Asc. of the req. Star, the nearest to which	09	06 is <i>Hydra's Heart</i> .

Example 2d. I would know what Star will be on the Meridian, at $\frac{1}{4}$ past two in the Morning, on the 26th of *June*?

	h.	m.
Sun's Right Ascension	06	22
Time from Noon	14	15
Rt. Asc. of req. Star, nearest to which in the Tables	20	37 is <i>Swan's Tail</i> .

A T A B L E of the Latitudes and Longitudes of Places, accounting the Longitudes from the Meridian of *L O N D O N*.

Places Names.	Latitude.		Longit.		Places Names.	Latitude.		Longit.	
The Coast of England.	D.	M.	D.	M.		D.	M.	D.	M.
B Erwick ———	55	48	01	45 W	Aberdeen ———	57	24 N	01	40 W
Newcastle ———	55	12	01	30 W	Dundee ———	56	28 N	02	40 W
Stockton ———	54	33	01	25 W	Edinburgh ———	55	58 N	02	59 W
Spurn ———	53	45	00	13 E	The Coast of Ireland.				
Yarmouth ———	52	40	01	38 E	Dublin ———	53	12	06	56
London ———	51	32	00	00	Wexford ———	52	13	07	27
North Foreland ———	51	25	01	24 E	Waterford ———	52	09	08	40
Beachy Head ———	50	46	00	25 E	Cork ———	51	49	09	30
Dunnose ———	50	38	01	23	Cape Clear ———	51	17	11	10
Portland ———	50	30	02	44	Limeric ———	52	23	09	35
Start ———	50	07	03	47	Galway ———	53	07	09	40
Lizard ———	49	57	05	14	Slime Head ———	53	20	11	15
Land's End ———	50	06	06	00	Londonderry ———	55	00	07	50
St. Mary Scilly ———	49	57	06	00	Belfast ———	54	39	06	30
Hartland Point ———	51	06	04	35	The Coast of Holland and Flanders.				
Lundy Island ———	51	20	04	40	Scaw ———	57	30	10	20
Bristol ———	51	33	04	35	Helighland ———	54	24	08	35
St. David's Head ———	51	00	04	22	Hambrough ———	53	41	10	35
Barfey Isle ———	52	44	05	00	Embden ———	53	05	07	35
Holyhead ———	53	23	04	50	The Fly ———	53	15	05	30
Liverpool ———	53	20	03	00	The Texel ———	53	15	05	10
Whitehaven ———	54	17	03	30	Amsterdam ———	52	23	05	04
Carlisle ———	54	47	03	05	Rotterdam ———	51	55	04	30
The Coast of Scotland.					The Brill ———	52	00	04	00
Glasgow ———	57	52	04	05	Sluice ———	51	14	03	43
N. Part of Sky Isle ———	57	45	05	45	Calais ———	50	58	01	54
N. Part Lewis Isle ———	58	20	07	20	The Coast of France and Portugal.				
St. Kilday ———	57	52	09	45	Dieppe ———	49	56 N	01	09 E
Farra Head ———	58	34	05	10	Cape de Hague ———	49	47 N	02	00 W
Isles of Orkney ———	59	10	03	22	Gaskets ———	49	50 N	02	20 W
Shetland S. Point ———	60	04	02	00	Guernsey ———	49	33 N	02	47 W
Buchannefs ———	57	45	01	18					

A T A B L E of Latitudes and Longitudes.

Places Names.	Latitude.		Longit.		Places Names.	Latitude.		Longit.	
	D.	M.	D.	M.		D.	M.	D.	M.
The Coast of France and Portugal									
Morlaix	48	33	03	49	Ancona	43	40	14	26
Ufhant	48	30	05	02	Venice	45	25	12	10
Brest	48	23	04	25	Lepanto	38	10	22	52
Penmark	47	48	04	24	Cape Matapan	36	33	22	41
Bellisle	47	20	03	16	Cape St. Angelo	36	32	23	56
Nantz	47	14	01	39	Athens	37	58	24	05
Island Dieu	46	34	02	13	Cape Matelo South	38	07	25	03
Isle of Ree	46	10	01	30	Part of Negropont				
Rochel	46	10	01	11	Cape Monte Sancto	40	26	25	02
Bourdeaux	44	50	00	38	Galipoly	40	33	27	20
Bilboa	43	29	02	58	Constantinople	40	59	28	56
Cape Ortegal	44	04	07	48	Smyrna	38	28	27	25
Cape Finister	43	12	09	40	Ephesus	38	01	27	53
Oporto	41	10	09	25	Antiocheta	36	30	32	40
Burlings	39	35	09	24	Scanderoon	36	34	36	30
Rocks of Lisbon	38	54	09	50	Tripoli	34	38	36	15
Cape St. Vincent	36	53	09	06	Alexandria	31	10	30	19
Cadiz	36	33	06	01	Cape Rufato	32	48	21	25
Cape Trefalgar	36	10	06	01	Cape Miserato	32	21	16	17
On the Main Continent within the Straits					Tripoly	32	54	13	10
Gibraltar	36	12	04	53W	Cape Bona	37	03	11	04
Cape de Gat	36	40	01	40W	Bona	36	52	08	19
Cape Paul	38	15	00	05	Algier	36	50	03	16
Cape Martin	38	46	00	40	Cape de Tres Forcas	35	30	02	04W
Barcelona	41	26	02	18	Tetuan	35	27	05	06W
Marseilles	43	18	05	27	Ceuta	35	54	04	45W
Toulon	43	07	06	02	Tangier	35	42	05	22W
Genoa	44	25	08	43	Islands within the Straits.				
Leghorn	43	28	10	35	Alboran	35	54	02	29W
Rome	41	54	12	45	Formentaria	38	33	01	55
Naples	40	51	14	46	Yvica	38	50	01	40
Cape Sparteventuro	37	55	16	55	Majorca City	39	30	03	03
Cape Collone	38	56	18	05	Port Mahon	39	42	04	12
Gallipoli	39	56	18	43	Gallita	37	41	08	44
Cape St. Mary	39	45	19	00	S. End of Sardinia	38	46	09	12
					N. End of Corfica	42	56	09	50

A TABLE of Latitudes and Longitudes.

Places Names.	Latitude.		Longit.		Places Names.	Latitude.		Longit.	
Islands within the Straits.	D.	M.	D.	M.		D.	M.	D.	M.
Gorgona	43	34	09	38	Affinee	04	15	02	17 W
Captia	43	03	14	54	Cape 3 Points	04	28	01	50 W
Lilboa	42	45	11	00	River Volta	05	55	03	25
Messina	38	07	16	20	River Formosa	07	00	07	20
Maritimo	38	12	17	09	Cape Formosa	04	15	06	40
Cape Passaro	36	38	15	40	New Callabar	04	42	08	33
Malta	35	53	14	32	Old Callabar	04	10	09	45
Corfu	39	42	20	06	River Camaroons	03	25	10	10
Zephalonia	38	15	21	00	River Angra	00	50	10	01
Zant	37	46	21	14	Cape Lopez	00	55	09	55
Morea	36	52	21	32	River Congo	05	40	15	25
Lemnos	39	59	25	37	Angola	08	57	15	56
Scio	38	22	26	12	Cape Negro	16	08	12	31
C. St. John, West- end of Candia	35	15	24	00	Cape St. Thomas	24	10	14	43
Cape Solomon, E. End of Candia	35	00	27	08	Cape Bona Esperance	34	07	19	35
City of Rhodes	36	42	28	05	The Western Islands.				
West-end of Cyprus	34	57	32	23	Corvo	39	54	30	55
East-end of Cyprus	35	31	35	00	Flores	39	32	30	54
The Coast of Barbary and Guiney.					Fial	38	53	28	15
Cape Spartel	35	50	05	49	Pico	38	40	27	20
Sallee	33	51	06	25	St. George	38	52	26	03
Cape Cantin	32	36	09	10	Tercera	38	57	25	34
Cape de Geer	32	27	10	06	St. Michael	38	06	23	36
Cape Bajadore	26	04	15	35	St. Maries	36	59	23	38
Cape Olerado	23	41	15	50	The Canary Islands.				
Cape Blanco	20	32	17	35	Ferro	27	54	17	45
Senegal	15	28	16	25	Palma	28	40	17	36
Cape de Verde	14	43	17	20	Gomera	28	06	17	05
River Gambia	13	08	15	31	Teneriff	28	23	16	28
Serralion	08	36	12	57	Madeira West-end	32	44	17	26
Cape Monserado	06	05	10	02	Porto Sancto	33	12	15	54
Cape Palmas	04	13	06	45	Canaria	27	52	15	10
Jaque Jaque	04	16	02	47	Forteventura	28	05	13	36
					Lancerota	29	02	12	45

*St. Maries Lat
N^o 37. 20
Long 24. 40*

*Fernigis Lat. 37. 20
Long 24. 40*

*Lat. Long
32. 40 - 17. 00*

A T A B L E of Latitudes and Longitudes.

Places Names.	Latitude.		Longit.		Places Names.	Latitude.		Longit.	
Cape de Verde Islands.	D.	M.	D.	M.		D.	M.	D.	M.
St. Vincent -----	17	17	24	20	Vifegapatam -----	17	43	83	57
St. Lucia -----	17	25	24	20	Cape Palmiras -----	20	42	87	52
St. Nicholas -----	17	05	23	28	Bengal -----	22	17	92	21
Brava -----	14	28	24	02	Cape Negrais -----	16	23	93	00
Fuego -----	14	50	23	41	Malacca -----	02	12	102	10
St. Jago -----	15	08	22	56	Siam Entrance -----	14	18	100	55
Isle of May -----	15	14	22	02	Cambodia Entrance	10	28	105	00
Isle Sal -----	16	50	22	08	Cochin -----	14	05	107	56
Bonavista -----	16	05	22	07	Canton -----	23	14	113	06
The Southern Islands.					Amoy or Quemoy	24	35	116	50
St. Mathews -----	01	30S	06	01W	Lampo -----	29	59	120	35
Ascension -----	07	40S	14	25W	Nanquin -----	32	55	120	01
St. Hellena -----	16	00S	06	14W	Islands in the East-Indies.				
Fernandepo -----	02	40N	10	30E	Madagascar or } S.e.	25	47	46	10
Princes -----	01	40N	09	15E	St. Laurence } N.e	12	10	51	05
St. Thomas -----	00	00	08	20E	Mayetta -----	13	10	45	38
Annabona -----	02	10S	07	27E	Mohillo -----	12	05	44	23
The Coast on the Main Continent in the East Indies.					Comero -----	11	40	43	50
Cape Lagulias -----	34	54S	21	20	St. Juan de Nova	16	30	42	40
Cape Corientes -----	23	40S	36	17	Mauritius -----	20	10	52	55
Mofambique -----	15	04S	41	10	Diego Roys -----	19	50	61	30
River de Fugos -----	00	14S	41	15	Romiras de } -----	28	45	67	17
Cape Bassos -----	04	06	47	38	Castelamas } -----	38	40	72	45
Cape Guardafoy -----	11	44	51	20	Amsterdam -----	16	38	64	30
Cape Rosulgat -----	22	41	59	45	St. Brandon -----	08	40	68	25
Cape Muca -----	23	32	59	45	Diego Gratiosa -----	03	53	52	36
Buffera -----	29	45	49	20	Quebella -----	06	55	68	45
Surrat -----	21	10	72	25	Bassos de Chagos -----	00	20	72	00
Goa -----	15	31	73	50	Yas de Diego Rays	07	14	73	04
Callicot -----	11	16	75	30	Maldivia { N. End	00	25	76	22
Cochin -----	09	54	75	55	Malique -----	09	00	72	58
Cape Camarine -----	07	50	77	25	Sacatra -----	12	21	54	05
Fort St. George -----	13	11	80	32	Abdeleur -----	12	04	53	04
Dew Point -----	16	08	81	32					

A TABLE of Latitudes and Longitudes.

Places Names.	Latitude.		Longit.		Places Names.	Latitude.		Longit.	
Islands in the East-Indies.	D.	M.	D.	M.	The Coast of America, in the South Sea	D.	M.	D.	M.
C. Gallo in Zeloan	06	07	81	15	Cape St. Sebastian—	42	45	127	55
Yas de Amber	00	00	52	30	Cape St. Lucia	23	20	111	46
Andama	12	10	93	32	Cape Corientes	19	40	109	30
Nicobar	07	11	93	40	Aquapulco	17	05	104	18
Sumatra N. W. end	05	22	94	50	Aquatulco	15	27	102	03
Verkins Island	02	22	94	07	Guatemala	14	25	101	00
Nassau Island	02	54	99	32	Panama	08	50	81	52
Bencola	03	55	104	08	Bay Bonaventura	03	24	78	06
Sumatra S. end	05	22	105	10	Isle Gallopega	00	00	90	10
Engano	05	50	101	43	Cape del Ajuga	06	38	80	50
Selam	08	20	102	13	Lima	12	15	77	30
Princes Island	06	30	104	02	Arica	18	29	73	10
Bantam in Java	06	11	105	55	La Serena	29	00	76	22
Batavia	06	16	106	46	I. Juan Fernando	33	15	83	18
Java E. end	08	32	113	30	Baldivia	39	35	81	10
Straits of Sundy	06	02	105	46	Port Steven	46	50	82	36
Banca S. end	03	20	106	45	Cape Victory	52	00	83	10
Borneo S. point	03	54	113	37	Cape Horn	57	58	79	55
Bandy Isles	04	55	127	17					
Celebes— { S. end	05	10	119	07	The Coast of Brazil from Cape Horn to Cape Roque.				
{ N. end	01	40	121	20					
Mindano W. Point	06	40	119	15	Magellan E. Entrance	52	00	75	05
Borneo N. Point	07	10	113	05	River Julian	48	40	74	34
Luconia { SW. Point	12	30	120	10	Cape Blanco near	46	50	72	07
{ NE. Point	18	35	120	05	River Camaroons				
Anian { W. Point	19	30	107	00	Buenos Ayres, or	34	35	57	54
{ E. Point	19	55	109	55	River Plate				
Formosa { S. Point	22	00	119	56	River Grand	31	55	52	00
{ N. Point	25	30	120	45	St. Katharine's	27	50	49	00
Piscadore Isles	23	30	118	35	Cape Frio	23	00	42	20
Island Chufan	30	38	120	35	Spirito Sancto	19	59	42	10
Japan— { SE. Point	35	30	140	30	P. Segura	16	31	40	35
{ SW. Point	35	00	128	30	Bay Todos Santos	12	46	41	00
					River St. Francisco	10	50	37	50

A TABLE of Latitudes and Longitudes.

Places Names.	Latitude.		Longit.		Places Names.	Latitude.		Longit.	
The Coast of Brazil, &c.	D.	M.	D.	M.		D.	M.	D.	M.
Cape St. Augustine	08	35S	35	20W	St. Bartholomew	17	52	62	06
Cape Roque	05	00S	35	47W	St. Martins	18	06	62	10
Tristian de Cunha	37	05S	13	24W	Anguillo	18	17	62	13
Trinidad	20	30S	30	00W	Virgins	18	30	63	25
Main Continent in the West-Indies.					St. Cruz	17	52	63	30
					Bieque	18	00	63	15
R. Amazons Entrance	00	00	49	56	Porto Rico St. John's	18	30	65	37
North Cape	02	05	49	56	St. Domingo, Hisp.	18	25	69	30
Surinam	06	25	56	50	Porto Royal Jamaica	17	40	76	32
Oronoque	08	15	59	25	East-end of Cuba	20	15	73	55
Cape Conquibaca	12	40	70	42	Havanna	22	40	82	55
Carthage	10	28	75	21	Bay of Hondy	22	45	83	40
Scots Settlement	08	30	78	45	Cape St. Anthony	21	45	85	32
Nicaragua Entrance	11	25	84	15	Bahama Islands.				
Cape Catoche	21	10	86	10					
Campechy	19	30	92	10	Bermudas	32	25	63	40
Le Vera Cruz	19	12	97	48	N. Point of Baha-	28	00	78	35
Escondido	30	20	89	30	ma Bank				
Cape Florida	24	57	80	30	Bahama Island	26	50	79	36
The Caribbe Islands.					Abacco S. Point	26	00	73	46
					Harbour Island	25	37	76	47
Trinidad	10	15	60	17	Andros N. Point	25	10	78	50
Tobago West-end	11	10	59	10	Providence	25	00	77	20
Granado	11	57	60	20	Illathera S. Point	24	40	75	56
Barbadoes	12	58	58	50	Cat Island	24	25	75	09
St. Vincent	13	12	60	12	Watling Island	24	03	74	35
St. Lucia	13	55	60	04	Rum Key	23	45	74	50
Martinico	14	43	60	54	Exuma	23	22	75	55
Dominico	15	23	60	30	Crooked Island N.	22	56	74	12
Marrigalante	15	58	60	20	Point				
Guardalupe	16	10	61	15	Atkins Key	22	17	74	05
Montferat	16	45	62	15	Meraparovuz	21	58	74	45
Antigua	17	05	61	45	Atwood Key	23	10	73	35
Nevis	17	05	62	32	French Key	22	40	73	40
St. Christophers	17	17	62	40	Mayaguana	22	35	72	46
Barbuda	17	56	60	40	Hogsties	21	17	73	55

A TABLE of Latitudes and Longitudes.

Places Names.	Latitude.	Longit.	Places Names.	Latitude.	Longit.
Bahama Islands.	D. M.	D. M.	The Coast Hudson's Bay and Straits.	D. M.	D. M.
Heneago —————	20 52N	73 46W	Buttons Isle —————	60 25	66 27
Caices Bank North } Point ————— }	21 50N	71 15W	Cape Charles —————	62 10	75 35
Turks Island —————	21 35N	70 08W	Cape Walsingham ———	62 35	77 55
Abrolho N. Point ———	21 35N	69 06W	Mansfield Isle ———	61 42	80 30
Plate Wreck —————	20 10N	68 15W	Cape Jones —————	54 55	78 58
The Coast of Carolina, Virginia, Maryland, Pensilvania, New-England, and Newfoundland.			Rupers River —————	51 30	79 26
			Albany River —————	52 26	84 50
			The Cubbs —————	54 10	82 40
			C. Henrietta Maria ———	55 07	84 30
			Port Nelson —————	57 10	93 58
			Cape Churchill ———	59 00	95 20
			Cape Southampton ———	61 55	86 48
			Shark Point —————	64 30	82 55
			Nottingham Isle ———	63 30	79 53
			Queen Ann's Forel. ———	63 48	74 45
			Resolution Isle ———	61 50	65 04
			Cape Farewell ———	59 45	46 45
			The Coast of Iceland, Greenland, Nova Zembla, and Northern Isles.		
Charles Town up- on Ashley River } 32 45	78 46	North Latitude. West Longitude.	Sound Royal —————	66 22	14 33
Cape Hatteras ———	35 15		Bargazar Point ———	66 20	16 35
Cape Henry ———	37 00		Whales Back ———	65 27	20 33
Cape Charles ———	37 16		Merchants Foreland —	63 25	17 05
Cape Hinlopen ———	38 50		Halliford —————	64 30	34 43
Long Island ———	40 50		Fair Foreland ———	66 20	26 27
New York ———	40 58		Grims Island ———	67 15	22 34
Cape Cod ———	42 12		Westmania Isles ———	63 30	22 24
Boston ———	42 30		Isles of Fero ———	62 06	05 00
Cape Sable ———	43 50		Beerenberg, or } John Man's Isle }	71 45	04 30E
Isle Sable ———	44 20		Point Look-out ———	76 25	15 36E
Cape Britain ———	46 00		Horn-Sound ———	76 45	13 36E
Quebec ———	46 55		Fair Foreland ———	79 20	10 52E
Bay of Brest ———	52 10		Hacluits Foreland ———	79 55	11 00E
Bell Island ———	52 07		Helie's Sound ———	78 55	21 50E
Cape St. John ———	50 15				
Cape Bonavista ———	49 15				
Trinity Bay Entrance	48 42				
Conception Bay ———	48 20				
St. John's Harbour	48 00				
Bay of Bulls ———	47 50				
Cape Race ———	46 40				
Cape St. Mary ———	47 10				
Placentia ———	47 45				
Cape Roy ———	48 00				

31.25
25.43
6.42
402
734

at St. George's Bank 41-45 N. 67-15 W. } Black Island - 41-15 - 67-15
at the North Cape 40-50 68-23 } Sandy Hook - 40-25 - 68-23
at Cape Cod 41-15 69-43 }
at Cape Sable 43-50 64-58 }
at Cape Britain 46-00 58-30 }
at Cape Henry 37-00 75-24 }
at Cape Charles 37-16 74-16 }
at Cape Hinlopen 38-50 74-56 }
at Long Island 40-50 72-45 }
at New York 40-58 73-53 }
at Cape Cod 42-12 68-55 }
at Boston 42-30 69-23 }
at Cape Sable 43-50 64-58 }
at Isle Sable 44-20 59-01 }
at Cape Britain 46-00 58-30 }
at Quebec 46-55 69-48 }
at Bay of Brest 52-10 56-57 }
at Bell Island 52-07 55-35 }
at Cape St. John 50-15 52-48 }
at Cape Bonavista 49-15 52-12 }
at Trinity Bay Entrance 48-42 52-20 }
at Conception Bay 48-20 52-08 }
at St. John's Harbour 48-00 51-39 }
at Bay of Bulls 47-50 51-29 }
at Cape Race 46-40 51-52 }
at Cape St. Mary 47-10 53-23 }
at Placentia 47-45 53-58 }
at Cape Roy 48-00 57-40 }

A TABLE of Latitudes and Longitudes.

Places Names.	Latitude.		Longit.		Places Names.	Latitude.		Longit.	
	D.	M.	D.	M.		D.	M.	D.	M.
The Coast of Iceland, Greenland, Nova-Zembla, and Northern Islands.									
Lees Foreland ———	78	05	23	25	Gottenburgh ———	57	50	12	15
Whale's Head ———	77	18	21	30	Elfinore ———	56	22	12	42
Hope Island ———	76	18	23	45	Copenhagen ———	55	41	12	50
Cherry or Bear Isle ———	74	30	18	08	Valsterborn ———	55	28	13	00
Admiralty Island ———	75	05	54	50	Kalmer ———	56	40	16	35
Fretum Borough ———	70	00	61	20	Stockholm ———	59	20	19	30
Cape Candinose ———	69	05	42	35	Wybourgh ———	60	52	29	16
Catnose ———	65	43	35	14	Petersburgh ———	60	00	30	25
Archangel Bar ———	64	30	40	30	Narva ———	59	27	28	25
Cross Island ———	66	31	36	33	Revel ———	59	27	24	51
Sweetnose ———	68	10	34	45	Riga ———	57	04	25	15
Kilduyn ———	69	30	31	20	Derwinda ———	57	15	22	00
North Cape ———	71	23	23	02	Koningsberg ———	54	43	21	35
Surroy ———	71	05	16	40	Dantzick ———	54	22	18	36
Tromsund ———	70	25	15	30	Wisby in Gotland ———	57	30	18	30
Læfort S.W. Point ———	68	15	09	30	Bornholm ———	55	15	14	45
Dronten ———	63	50	10	15	Straelfound ———	54	25	13	16
Stadland ———	62	10	04	38	Lubeck ———	54	06	09	55
North Bergen ———	60	10	05	40	Anout ———	56	50	11	06
Naze of Norway ———	57	45	07	24	Lefon ———	57	05	10	30
					Scaw ———	57	30	10	20
The Coast in the Sound and Baltic.									
Mardon ———	58	19N	08	57E					
Larwick ———	58	54N	09	20E					
Christiana ———	59	20N	10	00E					
Maesterland ———	57	53N	11	45E					

The Latitudes of any two Places being given, to find the Difference of Latitude between them.

Rule, If the Latitudes are both North, or both South, subtract the Less from the Greater, the Remainder will be the Difference of Latitude.

But

Rules for Latitude.

105

But if one Latitude be North, and the other South, then add them together, and their Sum will be the Difference of Latitude.

Example 1st. What is the Difference of Latitude between the *Lizard* and *Barbadoes*?

	d. m.
<i>Lizard</i> in Latitude _____	49 57 N.
<i>Barbadoes</i> , in Latitude _____	12 58 N.

631
210 N.

The Difference of Latitude _____ 36 59 N.

Example 2d. What is the Difference of Latitude between *Jamaica* and *Cape Bona Esperance*?

<i>Jamaica</i> , in Latitude _____	17 40 N.
<i>Cape Bona Esperance</i> , in Latitude _____	34 07 S.

63.
70.
5346
6.20

The Difference of Latitude _____ 51 47, which Degrees being multiplied by 60, and the odd 47 Min. 60 taken in, will give the Difference of Latitude in — 3107 Miles

Rules for Latitude.

The Latitude sail'd from, and the Difference of Latitude being given, to find what Latitude the Ship is come into.

Case the 1st. When you sail from North Latitude to the Northward, or from South Latitude to the Southward, add the Difference of Latitude (it being first brought into Degrees, if need be, by dividing it by 60, to the Latitude sail'd from, the Sum will be the Latitude you are come into, of the same Name with the Latitude sail'd from.

Example 1st. A Ship from a Place in the Latitude 14 10 N. fails to the Northward, till she makes her Difference of Latitude 04 21. What Latitude is she come into?

Latitude failed from _____	14 10 N.
Difference of Latitude _____	04 21 N.

Latitude of the Ship _____ 18 31 N.

Example 2d. A Ship from the Latitude 29 17 S. fails to the Southward till she makes her Difference of Latitude 374 Miles: What Latitude is she come into?

Latitude failed from _____	29 17 S.
Diff. of Lat. 374 Miles, divided by 60, makes _____	06 14 S.

Latitude of the Ship _____ 35 31 S.

P

Case

Case the 2d. When you fail from North Latitude to the Southward, or from South Latitude to the Northward, subtract the Difference of Latitude, if least, from the Latitude failed from, the Remainder is the Latitude come into, of the same Name with the Latitude you fail'd from.

But if the Difference of Latitude be biggest, then subtract the Latitude, from the Difference of Latitude, the Remainder will be the Latitude come into, of a contrary Name to the Latitude you failed from.

Example 1st. A Ship from Latitude 49 14 N. fails to the Southward till her Difference of Latitude be 521 Miles. What Latitude is she come into?

Latitude failed from ————— 49 14 N.
 Diff. of Lat. 521 Miles, divided by 60, makes 08 41 S.
 Latitude come into ————— 40 33 N.

Example 2d. A Ship from Latitude 4 18 S. fails to the Northward, till her Difference of Latitude be 10 24. What Latitude is she come into?

Latitude failed from ————— 04 18 S.
 Difference of Latitude ————— 10 24 N.
 Latitude come into ————— 06 06 N.

Rules for Longitude.

The Longitude of any two Places being given, to find the Difference of Longitude between them.

Rule. If the Longitudes are both East, or both West, subtract the lesser from the greater, the Remainder will be the Difference of Longitude.

But if one Longitude be East, and the other West, then add them together, and their Sum (if less than 180 Degrees) will be the Difference of Longitude; but if it be more than 180 Degrees, then subtract it from 360,00, and the Remainder will be the Difference of Longitude.

Example 1st. What is the Difference of Longitude between Cape Finister and Antigua.

Case

Rules for Longitude.

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Cape Finistere, in Longitude ————— 09 40 W.

Antigua, in Longitude ————— 61 45 W.

The Difference of Longitude ————— 52 05

Example 2d. What is the Difference of Longitude between Barcelona and the Rock of Lisbon?

Barcelona, in Longitude ————— 02 18 E.

Rock of Lisbon, in Longitude ————— 09 50 W.

The Difference of Longitude ————— 12 08

Example 3d. What is the Difference of Longitude between the S. E. Point of Japan, and the Island of St Christopher's?

S. E. Point of Japan, in Longitude ————— 140 30 E.

St. Christopher's in Longitude ————— 62 40 W.

Exceeds 180,00 — 203 10

Subtract it from — 360 00

Remains the Difference of Longitude ————— 156 50

The Longitude failed from, and the Difference of Longitude being given, to find what Longitude the Ship is come into.

Case 1st. When you fail from East Longitude to the Eastward, or from West Longitude to the Westward, add the Difference of Longitude to the Longitude failed from, the Sum (if less than 180 Degrees) is the Longitude come into, of the same Name with the Longitude you fail'd from.

But if the Sum should be more than 180 Degrees, then subtract it from 360.00, and the Remainder will be the Longitude you are come into, of a contrary Name to the Longitude you failed from.

Example 1st. A Ship from Longitude of 48 21 East, fails to the Eastward, till she makes her Difference of Longitude 287 Miles. What Longitude is she come into?

Longitude failed from ————— 48 21 E.

Difference of Longitude 287 Miles, or ————— 04 47 E.

Longitude come into ————— 53 08 E.

Example 2d. A Ship from the Longitude of 178 47 W. fails to the Westward till her Difference of Longitude be 12 17: What Longitude is she come into?

Rules for Longitude.

Longitude failed from _____ 178 47 W.
 Difference of Longitude _____ 12 17 W.

Exceeds 180,00—191 04
 Subtract it from—360 00

Remains the Longitude come into _____ 168 56 E.

Case the 2d. When you sail from East Longitude to the Westward, or from West Longitude to the Eastward, subtract the Difference of Longitude (if least) from the Longitude you sailed from, and the Remainder will be the Longitude come into, of the same Name with the Longitude failed from.

But if the Difference of Longitude be the biggest, then subtract the Longitude from the Difference of Longitude, and the Remainder will be the Longitude come into, of a contrary Name to the Longitude failed from.

Example the 1st. A ship from Longitude 98 17 E. fails to the W. ward, till she makes her Difference of Longitude 14 21: What Longitude is she come into?

Longitude failed from _____ 98 17 E.
 Difference of Longitude _____ 14 21 W.
 Longitude come into _____ 83 56 E.

Example the 2d. A ship from Longitude 44 21 West, fails to the Eastward till her Difference of Longitude be 81 42: What Longitude is she come into?

Longitude failed from _____ 44 21 W.
 Difference of Longitude _____ 81 42 E.
 Longitude come into _____ 37 21 E.

Here follows a Table of Meridional Parts, to every Degree and Minute of Latitude.

M	o d	1 d	2 d	3 d	4 d	5 d	6 d	7 d	8 d	9 d	10 c	11 d	12 d	13 d	M
0	0	60	120	180	240	300	361	421	482	542	603	664	725	787	0
1	1	61	121	181	241	301	362	422	483	543	604	665	726	788	1
2	2	62	122	182	242	302	363	423	484	544	605	666	727	789	2
3	3	63	123	183	243	303	364	424	485	545	606	667	728	790	3
4	4	64	124	184	244	304	365	425	486	546	607	668	729	791	4
5	5	65	125	185	245	305	366	426	487	547	608	669	730	792	5
6	6	66	126	186	246	306	367	427	488	548	609	670	731	793	6
7	7	67	127	187	247	307	368	428	489	549	610	671	732	794	7
8	8	68	128	188	248	308	369	429	490	550	611	672	733	795	8
9	9	69	129	189	249	309	370	430	491	551	612	673	735	796	9
10	10	70	130	190	250	310	371	431	492	552	613	674	736	797	10
11	11	71	131	191	251	311	372	432	493	553	614	675	737	798	11
12	12	72	132	192	252	312	373	433	494	554	615	676	738	799	12
13	13	73	133	193	253	313	374	434	495	555	616	677	739	800	13
14	14	74	134	194	254	314	375	435	496	556	617	678	740	801	14
15	15	75	135	195	255	315	376	436	497	557	618	679	741	802	15
16	16	76	136	196	256	316	377	437	498	558	619	680	742	803	16
17	17	77	137	197	257	317	378	438	499	559	620	681	743	804	17
18	18	78	138	198	258	318	379	439	500	560	621	682	744	805	18
19	19	79	139	199	259	319	380	440	501	561	622	683	745	806	19
20	20	80	140	200	260	320	381	441	502	562	623	684	746	807	20
21	21	81	141	201	261	321	382	442	503	563	624	685	747	808	21
22	22	82	142	202	262	322	383	443	504	564	625	686	748	809	22
23	23	83	143	203	263	323	384	444	505	565	626	687	749	810	23
24	24	84	144	204	264	324	385	445	506	566	627	688	750	811	24
25	25	85	145	205	265	325	386	446	507	567	628	689	751	812	25
26	26	86	146	206	266	326	387	447	508	568	629	690	752	813	26
27	27	87	147	207	267	327	388	448	509	569	630	691	753	814	27
28	28	88	148	208	268	328	389	449	510	570	631	692	754	815	28
29	29	89	149	209	269	329	390	450	511	571	632	693	755	816	29
30	30	90	150	210	270	330	391	451	512	572	633	694	756	817	30
31	31	91	151	211	271	331	392	452	513	573	634	695	757	818	31
32	32	92	152	212	272	332	393	453	514	574	635	696	758	819	32
33	33	93	153	213	273	333	394	454	515	575	636	697	759	820	33
34	34	94	154	214	274	334	395	455	516	576	637	698	760	821	34
35	35	95	155	215	275	335	396	456	517	577	638	699	761	822	35
36	36	96	156	216	276	336	397	457	518	578	639	700	762	823	36
37	37	97	157	217	277	337	398	458	519	579	640	701	763	824	37
38	38	98	158	218	278	338	399	459	520	580	641	702	764	825	38
39	39	99	159	219	279	339	400	460	521	581	642	703	765	826	39
40	40	100	160	220	280	340	401	461	522	582	643	704	766	827	40
41	41	101	161	221	281	341	402	462	523	583	644	705	767	828	41
42	42	102	162	222	282	342	403	463	524	584	645	706	768	829	42
43	43	103	163	223	283	343	404	464	525	585	646	707	769	830	43
44	44	104	164	224	284	344	405	465	526	586	647	708	770	831	44
45	45	105	165	225	285	345	406	466	527	587	648	709	771	832	45
46	46	106	166	226	286	346	407	467	528	588	649	710	772	833	46
47	47	107	167	227	287	347	408	468	529	589	650	711	773	834	47
48	48	108	168	228	288	348	409	469	530	590	651	712	774	835	48
49	49	109	169	229	289	349	410	470	531	591	652	713	775	836	49
50	50	110	170	230	290	350	411	471	532	592	653	714	776	837	50
51	51	111	171	231	291	351	412	472	533	593	654	715	777	838	51
52	52	112	172	232	292	352	413	473	534	594	655	716	778	839	52
53	53	113	173	233	293	353	414	474	535	595	656	717	779	840	53
54	54	114	174	234	294	354	415	475	536	596	657	718	780	841	54
55	55	115	175	235	295	355	416	476	537	597	658	719	781	842	55
56	56	116	176	236	296	356	417	477	538	598	659	720	782	843	56
57	57	117	177	237	297	357	418	478	539	599	660	721	783	844	57
58	58	118	178	238	298	358	419	479	540	600	661	722	784	845	58
59	59	119	179	239	299	359	420	480	541	601	662	723	785	846	59

M	14 d	15 d	16 d	17 d	18 d	19 d	20 d	21 d	22 d	23 d	24 d	25 d	26 d	27 d	M
0	848	910	973	1035	1098	1161	1225	1289	1354	1419	1484	1550	1616	1684	c
1	849	911	974	30	39	63	26	90	55	2	85	51	18	85	1
2	851	913	975	37	100	64	27	91	56	21	86	52	19	86	2
3	852	914	976	38	01	65	28	92	57	22	87	53	20	87	3
4	853	915	977	39	02	66	29	93	58	23	88	54	21	88	4
5	854	916	978	41	03	67	30	95	59	24	90	56	22	89	5
6	855	917	979	41	05	68	32	96	60	25	91	57	23	90	6
7	856	918	980	43	06	69	33	97	61	26	92	58	24	91	7
8	857	919	981	44	07	70	34	98	62	27	93	59	25	92	8
9	858	920	982	45	08	71	35	99	63	28	94	60	26	93	9
10	859	921	983	1045	1109	1172	1235	1300	1364	1429	1495	1561	1628	1695	10
11	860	922	984	47	10	73	37	01	66	31	96	62	29	96	11
12	861	923	985	48	11	74	38	02	67	32	97	63	30	97	12
13	862	924	986	49	12	75	39	03	68	33	98	64	31	98	13
14	863	925	987	50	13	76	40	04	69	34	99	65	32	99	14
15	864	926	988	51	14	77	41	05	70	35	1500	67	33	1700	15
16	865	927	989	52	15	78	42	06	71	36	02	68	34	01	16
17	866	928	990	53	16	79	43	07	72	37	03	69	35	03	17
18	867	929	991	54	17	81	44	08	73	38	04	70	37	04	18
19	868	930	992	55	18	82	45	10	74	39	05	71	38	05	19
20	869	931	993	1056	1119	1183	1246	1311	1375	1440	1506	1572	1639	1706	20
21	870	932	995	57	20	84	48	12	76	41	07	73	40	07	21
22	871	933	996	58	21	85	49	13	77	43	08	74	41	08	22
23	872	934	997	59	22	86	50	14	79	44	09	75	42	09	23
24	873	935	998	60	23	87	51	15	80	45	10	77	43	10	24
25	874	936	999	61	25	88	52	16	81	46	11	78	44	12	25
26	875	937	1000	63	26	89	53	17	82	47	13	79	45	13	26
27	876	938	1001	64	27	90	54	18	83	48	14	80	47	14	27
28	877	939	1002	65	28	91	55	19	84	49	15	81	48	15	28
29	878	941	1003	66	29	92	56	20	85	50	16	82	49	16	29
30	879	942	1004	1067	1130	1193	1257	1321	1386	1451	1517	1583	1650	1717	30
31	880	943	05	68	31	94	58	22	87	52	18	84	51	18	31
32	881	944	06	69	32	95	59	24	88	53	19	85	52	20	32
33	883	945	07	70	33	96	60	25	89	55	20	86	53	21	33
34	884	946	08	71	34	97	61	26	90	56	21	88	54	22	34
35	885	947	09	72	35	99	62	27	92	57	22	89	56	23	35
36	886	948	10	73	36	1200	64	28	93	58	24	90	57	24	36
37	887	949	11	74	37	01	65	29	94	59	25	91	58	25	37
38	888	950	12	75	38	02	66	30	95	60	26	92	59	26	38
39	889	951	13	76	39	03	67	31	96	61	27	93	60	27	39
40	890	952	1014	1077	1140	1204	1268	1332	1397	1462	1528	1594	1661	1729	40
41	891	953	15	78	41	05	69	33	98	63	29	95	62	30	41
42	892	954	16	79	42	06	70	34	99	64	30	96	63	31	42
43	893	955	18	80	44	07	71	35	1400	65	31	98	64	32	43
44	894	956	19	81	45	08	72	36	01	67	32	99	66	33	44
45	895	957	20	82	46	09	73	38	02	68	33	1600	67	34	45
46	896	958	21	83	47	10	74	39	03	69	35	01	68	35	46
47	897	959	22	85	48	11	75	40	05	70	36	02	69	36	47
48	898	960	23	86	49	12	76	41	06	71	37	03	70	38	48
49	899	961	24	87	50	13	77	42	07	72	38	04	71	39	49
50	900	962	025	088	1151	1214	1278	1343	1408	1473	1539	1605	1672	1740	50
51	901	963	26	89	52	16	80	44	09	74	40	06	73	41	51
52	902	964	27	90	53	17	81	45	10	75	41	08	75	42	52
53	903	965	28	91	54	18	82	46	11	76	42	09	76	43	53
54	904	966	29	92	55	19	83	47	12	77	43	10	77	44	54
55	905	967	30	93	56	20	84	48	13	79	44	11	78	45	55
56	906	968	31	94	57	21	85	49	14	80	46	12	79	47	56
57	907	970	32	95	58	22	86	50	15	81	47	13	80	48	57
58	908	971	33	96	59	23	87	52	16	82	48	14	81	49	58
59	909	972	34	97	60	24	88	53	18	83	49	15	82	50	59

VI	28 d	29 d	3 d	31 d	32 d	33 d	34 d	35 d	36 d	37 d	38 d	39 d	40 d	41 d	42
0	1751	1819	1888	1958	2028	2100	2171	2244	2318	2393	2468	2545	2623	2702	C
1	52	21	90	59	3	01	73	45	19	94	70	46	24	03	1
2	53	22	91	60	31	02	74	47	20	95	71	48	25	04	2
3	55	23	92	61	32	03	75	48	22	96	72	49	27	06	3
4	56	24	93	62	33	04	76	49	23	98	73	50	28	07	4
5	57	25	94	63	34	05	78	50	24	99	75	51	29	08	5
6	58	26	95	64	35	07	79	52	25	2400	76	53	31	10	6
7	59	27	96	65	36	08	80	53	27	01	77	54	32	11	7
8	60	29	98	67	38	09	81	54	28	03	78	55	33	11	8
9	61	30	99	68	39	10	82	55	29	04	80	57	34	14	9
10	1762	1831	1900	1970	2040	2111	2184	2256	2330	2405	2481	2558	2636	2715	10
11	64	32	01	71	41	13	83	58	32	06	82	59	37	16	11
12	65	33	02	72	43	14	86	59	33	08	84	60	38	18	12
13	66	34	03	73	44	15	87	60	34	09	85	62	40	19	13
14	67	35	05	74	45	16	88	61	35	10	86	63	41	20	14
15	68	37	06	76	46	17	90	63	37	11	87	64	42	22	15
16	69	38	07	77	47	18	91	64	38	13	89	66	44	23	16
17	70	39	08	78	48	20	92	65	39	14	90	67	45	24	17
18	72	40	09	79	50	21	93	66	40	15	91	68	46	26	18
19	73	41	10	80	51	22	94	68	42	16	92	69	48	27	19
20	1774	1842	1911	1981	2052	2123	2196	2269	2343	2418	2494	2571	2649	2728	20
21	75	43	13	83	53	25	97	70	44	19	95	72	50	29	21
22	76	45	14	84	54	26	98	71	45	20	96	73	51	31	22
23	77	46	15	85	56	27	99	72	46	21	98	75	53	32	23
24	78	47	16	86	57	28	2000	74	48	23	99	76	54	33	24
25	80	48	17	87	58	29	02	75	49	24	2500	77	55	35	25
26	81	49	18	88	59	31	03	76	50	25	01	78	57	36	26
27	82	50	20	90	60	32	04	77	51	27	03	80	58	37	27
28	83	52	21	91	61	33	05	79	53	28	04	81	59	39	28
29	84	53	22	92	63	34	07	80	54	29	05	82	61	40	29
30	1785	1854	1923	1993	2064	2135	2208	2281	2355	2430	2506	2584	2662	2742	30
31	86	55	24	94	65	37	09	82	56	32	08	85	63	43	31
32	87	56	25	95	66	38	10	83	58	33	09	86	65	44	32
33	89	57	27	97	67	39	11	85	59	34	10	88	66	46	33
34	90	58	28	98	69	40	13	86	60	35	12	89	67	47	34
35	91	60	29	99	70	41	14	87	61	37	13	90	69	48	35
36	92	61	30	2000	71	43	15	88	63	38	14	91	70	50	36
37	93	62	31	01	72	44	16	90	64	39	15	93	71	51	37
38	94	63	32	02	73	45	17	91	65	40	17	94	73	52	38
39	95	64	34	04	75	46	19	92	66	42	18	95	74	54	39
40	1797	1865	1935	2005	2076	2147	2220	2293	2368	2443	2519	2597	2675	2755	40
41	98	66	36	06	77	49	21	95	69	44	21	98	76	56	41
42	99	68	37	07	78	50	22	96	70	45	22	99	78	58	42
43	1800	69	38	08	79	51	24	97	71	47	23	2601	79	59	43
44	01	70	39	10	80	52	25	98	73	48	24	02	80	60	44
45	02	71	41	11	82	53	26	99	74	49	26	03	82	62	45
46	03	72	42	12	84	55	27	2301	75	51	27	04	83	63	46
47	05	73	43	13	85	56	28	02	76	52	28	06	84	64	47
48	06	75	44	14	86	57	30	03	78	53	30	07	86	66	48
49	07	76	45	15	87	58	31	04	79	54	31	08	87	67	49
50	1808	1877	1946	2017	2088	2159	2232	2306	2380	2456	2532	2610	2688	2768	50
51	09	78	48	18	89	61	33	07	81	57	33	11	90	70	51
52	10	79	49	19	90	62	35	08	83	58	35	12	91	71	52
53	11	80	50	20	91	63	36	09	84	59	36	14	92	72	53
54	13	81	51	21	92	64	37	11	85	61	37	15	94	74	54
55	14	83	52	22	94	65	38	12	86	62	38	16	95	75	55
56	15	84	53	24	95	67	39	13	88	63	40	17	96	76	56
57	16	85	55	25	96	68	41	14	89	64	41	19	98	78	57
58	17	86	56	26	97	69	42	16	99	66	42	20	99	79	58
59	18	87	57	27	98	70	43	17	91	67	44	21	2700	80	59

2297

2255

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VI	42 d	43 d	44 d	45 d	46 d	47 d	48 c	49 d	50 d	51 d	52 d	53 d	54 d	55 d	M
0	2782	2862	2946	3030	3111	3203	3292	3382	3474	3569	3666	3764	3862	3968	0
1	83	64	47	31	17	04	93	84	76	70	6	61	66	70	1
2	84	66	49	33	18	06	9	84	78	72	68	67	68	71	2
3	86	67	50	34	20	07	98	87	79	74	70	69	70	73	3
4	87	69	51	36	21	09	98	88	81	75	71	70	71	75	4
5	88	70	53	37	22	10	99	90	82	77	73	72	73	77	5
6	90	71	54	38	24	12	3301	91	84	78	74	73	74	78	6
7	91	73	56	40	26	13	01	93	85	80	77	75	77	80	7
8	92	74	57	41	27	14	03	94	8	82	7	77	78	82	8
9	94	75	58	43	29	16	05	9	88	83	80	79	80	84	9
10	2795	2877	2960	3044	3133	3217	3306	3397	3490	3585	3681	3780	3872	3985	10
11	97	73	61	46	31	19	08	99	92	86	83	82	83	87	11
12	98	80	63	47	33	20	09	40	93	8	85	84	85	89	12
13	99	81	64	48	34	21	11	01	95	90	86	85	87	91	13
14	2801	82	65	50	35	22	12	03	9	9	88	87	89	92	14
15	02	84	67	51	37	23	14	05	9	93	90	89	90	94	15
16	03	85	68	53	39	26	16	07	95	94	91	90	92	96	16
17	05	86	70	54	40	28	17	08	3501	96	93	92	94	98	17
18	06	88	71	55	42	29	19	10	03	98	95	94	95	99	18
19	07	89	72	57	43	31	20	11	04	99	96	95	97	4001	19
20	2809	2891	2974	3058	3144	3232	3322	3413	3506	3601	3698	3797	3899	4003	20
21	10	92	75	60	46	34	23	14	07	01	99	99	3901	05	21
22	11	93	76	61	47	35	25	16	09	04	3701	3800	02	06	22
23	13	95	78	63	49	37	26	17	10	06	03	02	04	08	23
24	14	96	79	64	50	38	27	19	12	07	04	04	06	10	24
25	15	97	81	65	52	40	29	20	14	09	06	05	07	12	25
26	17	99	82	67	53	41	31	22	15	10	08	07	09	14	26
27	18	2900	83	68	55	42	32	23	17	12	09	08	11	15	27
28	20	02	85	70	56	44	34	25	18	14	11	11	13	17	28
29	21	03	86	71	57	45	35	27	20	15	13	12	14	19	29
30	2822	2904	2988	3073	3159	3247	3337	3427	3521	3617	3714	3812	3916	4021	30
31	24	06	89	74	60	48	38	30	23	18	16	15	18	22	31
32	25	07	91	75	62	50	40	31	25	20	17	17	19	24	32
33	26	08	92	77	63	51	41	33	27	22	19	19	21	26	33
34	28	10	93	78	65	53	43	34	28	23	21	21	23	28	34
35	29	11	95	80	66	54	44	36	29	25	22	22	25	29	35
36	30	13	96	81	68	56	46	37	31	26	24	24	26	31	36
37	32	14	98	83	69	57	47	39	32	28	26	26	28	33	37
38	33	15	99	84	71	59	49	40	34	30	27	27	30	35	38
39	34	17	3000	85	72	60	50	42	36	31	29	29	32	37	39
40	2836	2918	3002	3087	3173	3262	3352	3443	3537	3633	3731	3831	3933	4038	40
41	37	19	03	88	75	63	53	45	39	34	32	32	35	40	41
42	39	21	05	90	76	65	55	47	40	36	34	34	37	42	42
43	40	22	06	91	78	66	56	48	42	38	36	36	38	44	43
44	41	24	07	93	79	68	58	50	43	39	37	38	40	45	44
45	43	25	09	94	81	69	59	51	45	41	39	39	42	47	45
46	44	26	10	95	82	71	61	52	47	43	41	41	44	48	46
47	45	28	12	97	84	72	62	54	49	45	44	44	47	51	47
48	47	29	13	98	85	74	64	56	50	47	46	46	49	52	48
49	48	31	14	3100	87	75	65	57	51	49	48	48	51	54	49
50	2849	2932	3016	3101	3188	3277	3367	3458	3553	3649	3747	3848	3951	4056	50
51	51	33	17	201	90	78	68	60	55	5	49	49	52	58	51
52	52	35	19	04	91	80	70	62	56	52	50	5	54	60	52
53	54	36	20	05	92	81	71	64	58	54	52	53	56	61	53
54	55	37	21	07	94	83	73	66	59	55	54	54	58	63	54
55	56	39	23	08	95	84	74	67	60	57	55	56	59	65	55
56	58	40	24	10	97	86	76	69	62	59	57	58	61	67	56
57	59	42	26	11	98	87	78	70	64	60	59	60	63	69	57
58	60	43	27	13	3200	89	79	71	65	62	60	61	64	70	58
59	62	44	28	1	01	90	81	73	67	64	62	63	66	72	59

3286
3213
73

M	56 d	57 d	58 d	59 d	60 d	61 d	62 d	63 d	64 d	65 d	66 d	67 d	68 d	69 d	M
0	4074	4183	4294	4409	4527	4649	4775	4905	5039	5179	5324	5474	5631	5795	0
1	76	84	96	11	29	51	77	07	42	81	26	77	33	97	1
2	77	86	98	13	31	53	79	09	44	84	28	79	36	5800	2
3	79	88	1300	15	33	55	81	12	46	86	31	82	39	03	3
4	81	90	82	17	35	57	84	14	49	88	33	84	42	06	4
5	83	92	04	19	37	60	86	16	51	91	36	87	44	09	5
6	85	94	06	21	39	62	88	18	53	93	38	89	47	10	6
7	86	95	08	23	41	64	90	20	55	95	41	92	50	14	7
8	88	97	09	25	43	66	92	23	58	98	43	95	53	17	8
9	90	99	11	27	45	68	94	25	60	100	46	97	55	20	9
10	4092	4201	4313	4429	4547	4670	4796	4927	5062	5203	5348	5500	5658	5821	10
11	94	03	15	31	49	72	98	29	65	05	52	08	60	25	11
12	95	05	17	33	51	74	1001	31	67	07	53	05	63	28	12
13	97	07	19	34	53	76	03	34	69	10	56	07	66	31	13
14	99	08	21	36	55	78	05	36	71	12	58	10	68	34	14
15	101	10	23	38	57	80	07	38	74	14	61	13	71	37	15
16	03	12	25	40	59	82	09	40	76	17	63	15	74	39	16
17	04	14	27	42	62	84	11	43	78	19	66	18	76	42	17
18	06	16	28	44	64	87	14	45	81	22	68	20	79	45	18
19	08	18	30	46	66	89	16	47	83	24	71	23	82	48	19
20	4110	4220	4332	4448	4568	4691	4818	4949	5085	5226	5373	5528	5685	5851	20
21	12	21	34	50	70	93	20	51	87	29	76	28	87	54	21
22	13	23	36	52	72	95	22	54	90	31	78	31	90	56	22
23	15	25	38	54	74	97	24	56	92	34	80	33	93	59	23
24	17	27	40	56	76	99	26	58	95	36	83	36	95	62	24
25	19	29	42	58	78	1001	29	60	97	38	85	39	98	65	25
26	21	31	44	60	80	03	31	63	99	41	88	41	1001	68	26
27	22	32	46	62	82	05	33	65	1002	43	90	44	04	71	27
28	24	34	47	64	84	07	35	67	04	46	93	46	06	74	28
29	26	36	49	66	86	10	37	69	06	48	95	49	09	76	29
30	4128	4238	4351	4468	4588	4712	4839	4972	5108	5250	5398	5552	5712	5879	30
31	30	40	53	70	90	14	42	74	11	53	5401	54	15	82	31
32	32	42	55	72	92	16	44	76	13	55	03	57	17	85	32
33	33	44	57	74	94	18	46	78	15	58	06	59	20	88	33
34	35	46	59	76	96	20	48	81	18	60	08	62	23	91	34
35	37	47	61	78	98	22	50	83	20	63	11	65	25	94	35
36	39	49	63	80	1000	24	52	85	22	65	13	67	28	96	36
37	41	51	65	82	02	26	55	87	25	67	16	70	31	99	37
38	42	53	67	84	04	28	57	90	27	70	18	73	34	1002	38
39	44	55	69	86	06	31	59	92	29	72	21	75	36	05	39
40	4146	4257	4370	4488	4608	4733	4861	4994	5132	5275	5423	5578	5739	5908	40
41	48	59	72	90	10	35	63	96	34	77	26	80	42	11	41
42	50	60	74	92	12	37	65	99	36	80	28	83	45	14	42
43	52	62	76	94	14	39	68	1001	39	82	31	86	47	17	43
44	53	64	78	95	16	41	70	03	41	84	33	88	50	19	44
45	55	66	80	97	18	43	72	05	43	87	36	91	53	22	45
46	57	68	82	99	20	45	74	08	46	89	38	94	56	25	46
47	59	70	84	1001	23	47	76	10	48	92	41	96	58	28	47
48	61	72	86	03	25	50	79	12	51	94	43	99	61	31	48
49	62	74	88	05	27	52	81	14	53	97	46	1002	64	34	49
50	4164	4275	4390	4507	4629	4754	4883	5017	5155	5299	5448	5604	5767	5937	50
51	66	77	92	09	31	56	85	19	58	1001	51	07	70	40	51
52	68	79	94	11	33	58	87	21	60	04	54	10	72	43	52
53	70	81	96	13	35	60	90	23	62	06	56	12	75	46	53
54	72	83	98	15	37	62	92	26	65	09	59	15	78	48	54
55	73	85	99	17	39	64	94	28	67	11	61	17	81	51	55
56	75	87	1001	19	41	66	96	30	69	14	64	20	83	54	56
57	77	89	03	21	43	69	98	33	72	16	66	23	86	57	57
58	79	91	05	22	45	71	1001	35	74	19	69	25	89	60	58
59	81	07	22	22	47	73	03	37	76	21	71	28	92	63	59

M	70 d	71 d	72 d	73 d	74 d	75 d	76 d	77 d	78 d	79 d	80 d	81 d	82 d	83 d	M
0	5966	6146	6335	6534	6746	6970	7210	7467	7745	8046	8375	8739	9145	9606	0
1	69	49	38	38	49	74	14	72	49	51	81	45	53	14	1
2	72	52	41	41	53	78	18	76	54	56	87	52	60	22	2
3	75	55	45	45	57	82	22	81	59	61	93	58	67	31	3
4	78	58	48	49	60	86	27	85	64	67	98	65	74	39	4
5	81	61	51	52	64	90	31	90	69	72	8404	71	82	47	5
6	84	64	54	55	68	94	35	94	74	77	10	78	89	55	6
7	86	67	58	58	71	97	39	98	78	83	16	84	96	64	7
8	89	70	61	62	75	7001	43	7503	83	88	22	91	9203	72	8
9	92	73	64	65	79	05	47	07	88	93	27	97	11	80	9
10	5995	6177	6367	6569	6782	7009	7252	7512	7793	8099	8433	8804	9218	9689	10
11	98	80	71	72	86	13	56	16	98	3104	39	10	25	97	11
12	6001	83	74	76	90	17	60	21	1803	09	45	17	33	9706	12
13	04	86	77	79	93	21	64	25	08	15	51	23	40	14	13
14	07	89	80	83	97	25	68	30	13	20	57	30	48	23	14
15	10	92	84	86	6801	29	73	35	17	25	63	36	55	31	15
16	13	95	87	90	04	33	77	39	22	31	69	43	62	40	16
17	16	98	90	93	08	37	81	44	27	36	74	49	70	48	17
18	19	6201	94	97	12	41	85	48	32	41	80	56	77	57	18
19	22	05	97	6600	15	45	89	51	37	47	86	63	85	65	19
20	6025	6208	6400	6603	6819	7048	7294	7557	7842	8152	8492	8869	9292	9774	20
21	28	11	03	07	23	52	98	62	47	58	98	76	9300	83	21
22	31	14	07	10	26	56	7302	66	52	63	8504	83	07	91	22
23	34	17	10	14	30	60	06	71	57	68	10	89	15	9800	23
24	37	20	13	17	34	64	11	76	62	74	16	96	22	09	24
25	40	23	17	21	38	68	15	80	67	79	22	903	30	17	25
26	43	26	20	24	41	72	19	85	72	85	28	09	37	26	26
27	46	30	23	28	45	76	23	89	77	90	34	16	45	35	27
28	49	33	27	31	49	80	28	94	82	96	40	23	53	44	28
29	52	36	30	35	53	84	32	99	87	2201	46	30	60	52	29
30	6055	6239	6433	6639	6856	7088	7336	7603	7892	8207	8552	8936	9368	9861	30
31	58	42	37	42	60	92	41	08	97	12	58	43	76	70	31
32	61	45	40	46	64	96	45	12	902	18	65	50	83	79	32
33	64	49	43	49	68	7100	49	17	07	23	71	57	91	88	33
34	67	52	47	53	71	04	53	22	12	29	77	63	99	97	34
35	70	55	50	56	75	08	58	26	17	34	83	70	9407	9906	35
36	73	58	53	60	79	12	62	31	22	40	89	77	14	15	36
37	76	61	57	63	83	16	66	36	27	45	95	84	22	24	37
38	79	64	60	67	86	20	71	40	32	51	3601	91	30	33	38
39	82	68	63	70	90	24	75	35	37	56	07	98	38	42	39
40	6085	6271	6467	6674	6894	7128	7379	7650	7942	8262	8614	9005	9445	9951	40
41	88	74	70	77	98	32	84	54	48	67	20	12	53	60	41
42	91	77	73	81	6901	36	88	59	53	73	26	18	61	69	42
43	94	80	77	85	05	40	92	64	58	79	32	25	69	78	43
44	97	83	80	88	09	45	97	68	63	84	38	32	77	87	44
45	6100	87	83	92	13	49	7401	73	68	90	44	39	85	9996	45
46	03	90	87	95	17	53	06	78	73	95	51	46	93	10005	46
47	06	93	90	99	20	57	10	83	78	8301	57	53	9501	10015	47
48	09	96	94	6702	24	61	14	87	83	07	63	60	09	10024	48
49	12	99	97	06	28	65	19	92	89	12	69	67	17	10033	49
50	6115	6303	6500	6710	6932	7169	7423	7697	7994	8318	8676	9074	9525	10043	50
51	18	06	04	13	36	73	27	7702	99	24	82	81	33	10052	51
52	21	09	07	17	40	77	32	06	8004	29	88	88	41	10061	52
53	24	12	11	20	43	81	36	11	09	35	95	96	49	10071	53
54	27	15	14	24	47	85	41	16	14	41	8701	9103	57	10080	54
55	30	19	17	28	51	89	45	21	20	47	07	10	65	10089	55
56	33	22	21	31	55	94	49	25	25	52	14	17	73	10099	56
57	36	25	24	35	59	98	54	30	30	58	20	24	81	10108	57
58	40	28	28	38	63	7202	58	35	35	64	26	31	89	10118	58
59	43	23	31	42	66	06	63	40	40	69	33	38	98	10127	59

M	84 d	85 d	86 d	87 d	88 d	89 d	M
0	10137	10765	11533	12522	13916	6300	0
1	147	776	547	541	945	357	1
2	157	788	561	561	974	416	2
3	166	799	576	580	14003	476	3
4	175	811	590	599	033	537	4
5	185	822	605	615	063	599	5
6	195	834	620	639	093	662	6
7	205	846	634	659	123	726	7
8	214	858	649	679	154	782	8
9	224	869	664	699	184	858	9
10	10234	10881	11679	12719	14216	16926	10
11	244	893	694	739	247	956	11
12	255	905	709	759	279	17067	12
13	264	917	724	780	311	135	13
14	273	929	739	801	343	213	14
15	283	941	755	821	376	289	15
16	292	953	770	842	408	366	16
17	303	965	785	863	442	445	17
18	314	978	801	884	475	526	18
19	324	990	816	906	509	609	19
20	10334	11002	11832	12927	14543	17693	20
21	344	014	848	949	578	781	21
22	354	027	863	970	613	870	22
23	364	039	879	992	648	962	23
24	374	052	895	13014	684	18056	24
25	385	064	911	036	720	153	25
26	395	077	927	059	756	257	26
27	405	089	943	081	793	355	27
28	416	102	959	104	830	461	28
29	426	115	976	126	868	570	29
30	10437	11127	11952	13147	14906	18682	30
31	447	140	12008	172	943	795	31
32	457	153	025	195	983	920	32
33	468	177	041	230	15022	15045	33
34	478	177	058	242	062	174	34
35	489	192	075	266	102	309	35
36	500	205	092	290	143	450	36
37	510	215	109	314	184	596	37
38	521	31	126	338	226	749	38
39	532	244	143	362	268	900	39
40	10542	11257	12100	13286	15311	20076	40
41	553	270	177	41	354	253	41
42	564	284	194	436	398	439	42
43	575	297	212	461	442	635	43
44	586	310	229	486	487	843	44
45	597	324	247	511	532	21065	45
46	608	337	264	537	579	303	46
47	619	351	282	562	625	557	47
48	630	365	300	587	673	832	48
49	641	378	318	615	721	22132	49
50	10652	11392	12336	13641	15770	21459	50
51	663	406	354	668	819	22821	51
52	674	420	37	693	869	23226	52
53	685	434	391	721	920	23685	53
54	696	448	409	749	972	24215	54
55	708	462	428	776	16024	24842	55
56	719	476	447	804	078	25609	56
57	730	490	465	832	132	26598	57
58	742	504	484	860	187	27992	58
59	753	518	503	888	243	30195	59

The Use of the Table of Meridional Parts.

IN this Table the first and last Column of every Page marked M, beginning at 0, and ending at 59, contain the Min. answering to every Degree or Latitude, the other Column marked 1d, 2d, &c. contain the Meridional Parts, answering to the Degree of Latitude they stand under.

So that if you would find the Meridional Parts, answering to any Latitude, suppose for Example, the Latitude 51.32, look in the Column under 51d. and right against 32, (in the Column for Minutes) you will find 20, to which prefix 36, the two Figures in the same Column that stand above 20 towards the Left-Hand, and it makes 3620, the Meridional Parts required.

Two Latitudes being given to find the Meridional Difference of Latitude.

Case 1st. If both Latitudes be North, or both South, subtract the Meridional Parts of the Less from the Meridional Parts of the Greater, the Remainder will be the Meridional Difference of Latitude.

Case 2d. If one Latitude be North and the other South, then add their Meridional Parts together, and the Sum will be the Meridional Difference of Latitude.

A TABLE of Amplitudes, from the Latitude
00 Deg. 00 Min. to the Latitude 12 Degrees
either North or South.

Degrees of Declination.	The Degrees of Latitude.											
	1	2	3	4	5	6	7	8	9	10	11	12
	D M D M D M D M D M D M D M D M D M D M											
0	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00
1	01 00	01 00	01 00	01 00	01 00	01 00	01 00	01 00	01 00	01 01	01 01	01 01
2	02 00	02 00	02 00	02 00	02 00	02 00	02 01	02 01	02 01	02 02	02 02	02 02
3	03 00	03 00	03 00	03 00	03 00	03 01	03 01	03 02	03 02	03 03	03 03	03 03
4	04 00	04 00	04 00	04 00	04 01	04 01	04 02	04 03	04 03	04 04	04 04	04 04
5	05 00	05 00	05 00	05 01	05 01	05 01	05 02	05 03	05 03	05 05	05 05	05 07
6	06 00	06 00	06 00	06 01	06 01	06 01	06 02	06 03	06 04	06 06	06 07	06 08
7	07 00	07 00	07 01	07 01	07 02	07 02	07 03	07 04	07 05	07 07	07 07	07 09
8	08 00	08 00	08 01	08 01	08 02	08 02	08 03	08 04	08 06	08 08	08 09	08 11
9	09 00	09 00	09 01	09 01	09 02	09 02	09 04	09 05	09 07	09 09	09 10	09 12
10	10 00	10 00	10 01	10 01	10 02	10 03	10 04	10 05	10 07	10 10	10 11	10 13
11	11 00	11 00	11 01	11 01	11 03	11 03	11 05	11 06	11 08	11 11	11 12	11 15
12	12 00	12 00	12 01	12 01	12 03	12 04	12 05	12 07	12 09	12 12	12 13	12 16
13	13 00	13 00	13 01	13 02	13 05	13 04	13 06	13 08	13 10	13 13	13 15	13 18
14	14 00	14 00	14 01	14 02	14 03	14 04	14 06	14 09	14 10	14 14	14 16	14 19
15	15 00	15 00	15 01	15 02	15 04	15 05	15 07	15 09	15 11	15 15	15 17	15 21
16	16 00	16 01	16 01	16 02	16 04	16 05	16 07	16 09	16 12	16 16	16 18	16 22
17	17 00	17 01	17 01	17 02	17 04	17 05	17 08	17 10	17 13	17 17	17 20	17 23
18	18 00	18 01	18 01	18 02	18 04	18 06	18 08	18 11	18 14	18 18	18 21	18 25
19	19 00	19 01	19 01	19 03	19 04	19 06	19 09	19 11	19 15	19 19	19 22	19 26
20	20 00	20 01	20 02	20 03	20 05	20 07	20 09	20 12	20 16	20 20	20 24	20 28
21	21 00	21 01	21 02	21 03	21 05	21 07	21 10	21 13	21 17	21 21	21 25	21 29
22	22 00	22 01	22 02	22 03	22 05	22 07	22 10	22 13	22 17	22 22	22 26	22 31
23	23 00	23 01	23 02	23 03	23 05	23 08	23 11	23 14	23 18	23 23	23 28	23 33
23-29	23 29	23 30	23 31	23 33	23 35	23 38	23 40	23 44	23 49	23 54	23 57	24 02

A T A B L E of Amplitudes, from the Latitude
13 Deg. 00 Min. to the Latitude 24 Degrees
either North or South.

The Degrees of Latitude.

Degrees of Declination.	13		14		15		16		17		18		19		20		21		22		23		24	
	D	M	D	M	D	M	D	M	D	M	D	M	D	M	D	M	D	M	D	M	D	M	D	M
0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1	01	02	01	02	01	02	01	02	01	02	01	03	01	03	01	04	01	04	01	04	01	05	01	05
2	02	03	02	03	02	04	02	05	02	05	02	06	02	07	02	08	02	08	02	09	02	10	02	11
3	03	05	03	05	03	06	03	07	03	08	03	09	03	10	03	02	03	13	03	14	03	15	03	17
4	04	06	04	07	04	08	04	10	04	11	04	12	04	13	04	15	04	17	04	19	04	21	04	23
5	05	08	05	09	05	11	05	12	05	13	05	15	05	17	05	19	05	21	05	23	05	26	05	28
6	06	10	06	11	06	13	06	15	06	16	06	19	06	21	06	23	06	26	06	28	06	31	06	34
7	07	11	07	13	07	15	07	17	07	19	07	22	07	24	07	27	07	30	07	33	07	37	07	40
8	08	12	08	15	08	17	08	19	08	22	08	25	08	28	08	31	08	34	08	38	08	42	08	45
9	09	14	09	17	09	19	09	22	09	25	09	28	09	31	09	35	09	39	09	43	09	47	09	51
10	10	15	10	18	10	21	10	24	10	27	10	38	10	34	10	38	10	43	10	47	10	52	10	57
11	11	17	11	20	11	23	11	27	11	30	11	34	11	38	11	43	11	48	11	52	11	58	12	03
12	12	19	12	22	12	25	12	29	12	33	12	38	12	42	12	47	12	52	12	57	13	03	13	10
13	13	21	13	24	13	28	13	32	13	36	13	41	13	47	13	52	13	58	14	04	14	10	14	17
14	14	22	14	26	14	30	14	34	14	39	14	44	14	50	14	55	15	01	15	07	15	14	15	21
15	15	24	15	28	15	32	15	37	15	42	15	47	15	53	16	00	16	05	16	12	16	19	16	27
16	16	26	16	30	16	35	16	40	16	45	16	51	16	57	17	03	17	10	17	18	17	25	17	34
17	17	28	17	32	17	37	17	42	17	48	17	54	18	01	18	07	18	15	18	23	18	31	18	40
18	18	30	18	34	18	40	18	45	18	51	18	57	19	05	19	11	19	20	19	28	19	33	19	41
19	19	31	19	36	19	42	19	48	19	54	20	01	20	08	20	16	20	24	20	33	20	47	20	52
20	20	33	20	38	20	44	20	51	20	57	21	05	21	12	21	20	21	29	21	09	21	49	21	59
21	21	35	21	41	21	46	21	53	22	00	22	08	22	16	22	25	22	34	22	44	22	55	23	06
22	22	37	22	43	22	49	22	56	23	04	23	12	23	20	23	29	23	36	23	50	24	01	24	12
23	23	38	23	45	23	51	23	59	24	07	24	15	24	24	24	34	24	44	24	55	25	07	25	19
24	24	08	24	15	24	22	24	29	24	38	24	46	24	56	25	05	25	16	25	27	25	39	25	51

A TABLE of Amplitudes, from the Latitude
25 Deg. 00 Min. to the Latitude 36 Degrees
either North or South.

Degrees of Declination.	The Degrees of Latitude.											
	25	26	27	28	29	30	31	32	33	34	35	36
	DM	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M
0	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00
1	01 06	01 07	01 07	01 08	01 08	01 09	01 10	01 10	01 11	01 12	01 13	01 14
2	02 12	02 13	02 14	02 16	02 17	02 18	02 20	02 21	02 23	02 25	02 27	02 28
3	03 18	03 20	03 22	03 24	03 25	03 28	03 30	03 33	03 35	03 37	03 40	03 43
4	04 25	04 27	04 29	04 32	04 34	04 37	04 40	04 43	04 46	04 50	04 53	04 57
5	05 31	05 33	05 36	05 40	05 43	05 46	05 50	05 54	05 58	06 02	06 06	06 11
6	06 37	06 41	06 44	06 48	06 52	06 56	07 00	07 04	07 09	07 15	07 20	07 25
7	07 43	07 48	07 51	07 56	08 00	08 05	08 10	08 16	08 21	08 27	08 33	08 39
8	08 50	08 54	08 59	09 03	09 09	09 15	09 21	09 27	09 33	09 39	09 47	09 54
9	09 56	10 01	10 06	10 12	10 18	10 24	10 31	10 37	10 45	10 52	11 00	11 09
10	11 02	11 07	11 14	11 20	11 26	11 33	11 41	11 48	11 56	12 04	12 13	12 23
11	12 09	12 15	12 22	12 29	12 36	12 43	12 52	13 00	13 09	13 17	13 28	13 38
12	13 16	13 23	13 29	13 37	13 45	13 53	14 02	14 11	14 21	14 31	14 42	14 53
13	14 23	14 31	14 38	14 46	14 54	15 03	15 13	15 23	15 33	15 44	15 56	16 09
14	15 29	15 37	15 45	15 54	16 03	16 13	16 23	16 34	16 45	16 57	17 11	17 24
15	16 55	16 44	16 53	17 03	17 12	17 23	17 34	17 46	17 58	18 11	18 45	18 39
16	17 42	17 51	18 01	18 11	18 22	18 33	18 45	18 58	19 11	19 25	19 39	19 55
17	18 49	18 59	19 09	19 20	19 31	19 43	19 56	20 10	20 24	20 39	20 54	21 11
18	19 56	20 06	20 17	20 29	20 41	20 54	21 08	21 22	21 37	21 53	22 10	22 27
19	21 03	21 14	21 26	21 38	21 51	22 05	22 19	22 34	22 50	23 07	23 25	23 43
20	22 10	22 22	22 34	22 48	23 01	23 16	23 31	23 47	24 04	24 21	24 40	25 00
21	23 17	23 30	23 43	23 57	24 11	24 27	24 43	25 00	25 18	25 36	25 56	26 18
22	24 24	24 38	24 51	25 06	25 22	25 38	25 55	26 13	26 32	26 51	27 12	27 35
23	25 32	25 46	26 00	26 16	26 32	26 49	27 07	27 26	27 46	28 07	28 29	28 53
23.29	26 05	26 19	26 34	26 49	27 06	27 23	27 42	28 01	28 22	28 44	29 06	29 34

A TABLE of Amplitudes, from the Latitude
37 Deg. 00 Min. to the Latitude 48 Degrees
either North or South.

Degrees of Declination.	The Degrees of Latitude.											
	37	38	39	40	41	42	43	44	45	46	47	48
	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M
0	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00
1	01 15	01 16	01 17	01 18	01 19	01 21	01 22	01 23	01 24	01 26	01 28	01 29
2	02 30	02 32	02 34	02 36	02 39	02 41	02 44	02 47	02 50	02 53	02 56	02 59
3	03 45	03 48	03 51	03 55	03 58	04 02	04 06	04 10	04 15	04 19	04 24	04 29
4	05 00	05 05	05 08	05 13	05 18	05 23	05 28	05 34	05 41	05 46	05 52	05 59
5	06 15	06 21	06 26	06 32	06 38	06 44	06 51	06 58	07 05	07 12	07 20	07 29
6	07 31	07 37	07 43	07 50	07 57	08 05	08 13	08 21	08 30	08 39	08 49	08 59
7	08 46	08 54	09 01	09 09	09 17	09 26	09 35	09 45	09 56	10 06	10 18	10 30
8	10 02	10 11	10 19	10 28	10 37	10 47	10 58	11 09	11 21	11 34	11 47	12 00
9	11 17	11 27	11 37	11 47	11 57	12 09	12 21	12 34	12 47	13 01	13 16	13 31
10	12 32	12 43	12 54	13 05	13 18	13 31	13 44	13 58	14 13	14 28	14 44	15 02
11	13 49	14 01	14 12	14 25	14 39	14 53	15 07	15 22	15 38	15 56	16 15	16 34
12	15 05	15 18	15 31	15 45	16 00	16 15	16 31	16 48	17 06	17 25	17 44	18 06
13	16 21	16 35	16 49	17 05	17 20	17 37	17 55	18 13	18 33	18 54	19 16	19 39
14	17 38	17 53	18 08	18 24	18 42	19 00	19 19	19 39	20 00	20 23	20 47	21 12
15	18 54	19 10	19 27	19 44	20 04	20 23	20 43	21 05	21 28	21 52	22 18	22 45
16	20 11	20 28	20 46	21 05	21 25	21 46	22 08	22 32	22 57	23 23	23 50	24 20
17	21 28	21 46	22 06	22 26	22 47	23 10	23 34	23 59	24 25	24 53	25 23	25 55
18	22 46	23 05	23 26	23 47	24 10	24 34	24 59	25 26	25 54	26 24	26 57	27 31
19	24 03	24 24	24 46	25 09	25 33	25 58	26 25	26 54	27 25	27 58	28 32	29 07
20	25 21	25 43	26 06	26 31	26 56	27 24	27 53	28 23	28 56	29 31	30 07	30 45
21	26 39	27 03	27 27	27 53	28 21	28 50	29 20	29 53	30 27	31 03	31 42	32 23
22	27 58	28 23	28 49	29 16	29 45	30 16	30 48	31 22	31 58	32 37	33 18	34 03
23	29 17	29 43	29 11	30 40	31 11	31 43	32 16	32 51	33 30	34 12	34 56	35 43
24	29 56	30 22	30 50	31 20	31 52	32 28	33 03	33 40	34 20	35 03	35 48	36 35

A TABLE of Amplitudes, from the Latitude
49 Deg. 00 Min. to the Latitude 60 Degrees
either North or South.

Degrees of Declination.	The Degrees of Latitude.											
	49	50	51	52	53	54	55	56	57	58	59	60
	D M D M	D M D M	D M D M	D M D M	D M D M	D M D M	D M D M	D M D M	D M D M	D M D M	D M D M	D M D M
0	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00
1	01 31	01 33	01 35	01 07	01 39	01 42	01 45	01 47	01 50	01 53	01 55	02 03
2	03 03	03 06	03 10	03 15	03 20	03 24	03 29	03 34	03 40	03 46	03 53	04 00
3	04 34	04 40	04 46	04 52	04 59	05 06	05 14	05 22	05 31	05 40	05 50	06 00
4	06 06	06 14	06 22	06 30	06 39	06 48	06 59	07 10	07 22	07 34	07 47	08 01
5	07 38	07 48	07 58	08 08	08 19	08 31	08 44	08 57	09 11	09 26	09 43	10 02
6	09 10	09 21	09 33	09 46	10 00	10 15	10 30	10 47	11 04	11 22	11 42	12 04
7	10 42	10 55	11 09	11 24	11 40	11 57	12 15	12 35	12 56	13 18	13 41	14 06
8	12 14	12 29	12 45	13 02	13 21	13 41	14 02	14 24	14 48	15 14	15 41	16 10
9	13 47	14 05	14 24	14 43	15 04	15 26	15 49	16 14	16 45	17 10	17 41	18 14
10	15 21	15 40	16 01	16 23	16 46	17 31	17 37	18 05	18 33	19 07	19 41	20 18
11	16 54	17 16	17 39	18 03	18 29	18 57	19 26	19 56	20 29	21 04	21 43	22 26
12	18 28	18 52	19 18	19 44	20 12	20 43	21 15	21 49	22 25	23 04	23 47	24 34
13	20 03	20 29	20 57	21 26	21 57	22 30	23 05	23 43	24 23	25 07	25 54	26 44
14	21 38	22 06	22 37	23 08	23 42	24 18	24 56	25 37	26 21	27 09	28 01	28 55
15	23 14	23 45	24 18	24 52	25 28	26 07	26 49	27 34	28 22	29 14	30 12	31 09
16	24 51	25 24	25 59	26 36	27 16	27 58	28 43	29 32	30 24	31 21	32 22	33 27
17	26 28	27 03	27 41	28 21	29 04	29 50	30 39	31 31	32 27	33 28	34 32	35 47
18	28 06	28 43	29 24	30 07	30 53	31 42	32 35	33 33	34 34	35 40	36 53	38 09
19	29 45	30 55	31 08	31 55	32 45	33 38	34 35	35 36	36 40	37 54	39 13	40 36
20	31 25	32 08	32 54	33 44	34 39	35 35	36 36	37 42	38 53	40 12	41 37	43 40
21	33 06	33 52	34 41	35 34	36 31	37 32	38 39	39 51	41 09	42 34	44 05	45 38
22	34 48	35 37	36 30	37 27	38 29	39 26	40 47	42 04	43 27	44 59	46 40	48 20
23	36 33	37 26	38 23	39 24	40 29	41 40	42 56	44 19	45 50	47 30	49 21	51 54
23-29	37 26	38 20	39 19	40 23	41 29	42 46	44 00	45 27	47 02	48 46	50 47	52 1

A TABLE of Amplitudes, from the Latitude 61 Deg. 00 Min. to the Latitude 66 Deg. either North or South.

Degrees of Declination.	The Degrees of Latitude.												The Use of the TABLES of Amplitudes.
	61		62		63		64		65		66		
	D	M	D	M	D	M	D	M	D	M	D	M	
0	00	00	00	00	00	00	00	00	00	00	00	00	The Amplitude of the Sun, or any Star, is so many Degrees Distance as they rise or set from the East or West Points of the Horizon, either Northerly or Southerly.
1	02	03	02	07	02	12	02	17	02	22	02	27	
2	04	08	04	15	04	24	04	33	04	44	04	55	
3	06	12	06	24	06	37	06	51	07	06	07	23	
4	08	17	08	32	08	50	09	09	09	30	09	52	<i>Note</i> , When the Sun or Stars have North Declination, then the Amplitude found by these Tables must be reckoned from the East toward the North at their Rising, or from the West toward the North at their Setting.
5	10	21	10	41	11	04	11	28	11	54	12	22	
6	12	27	12	52	13	19	13	47	14	19	14	53	
7	14	34	15	02	15	34	16	08	16	45	17	26	
8	16	40	17	14	17	51	18	30	19	13	20	00	
9	18	49	19	28	20	09	20	54	21	43	22	37	But if they have South Declination, then the Amplitude must be reckoned from the East toward the South at their Rising, or from the West toward the South at their Setting.
10	20	57	21	40	22	27	23	18	24	13	25	14	
11	23	10	23	58	24	51	25	48	26	50	27	58	
12	25	21	26	17	27	15	28	19	29	28	30	44	
13	27	39	28	37	29	42	30	52	32	09	33	34	
14	29	56	31	01	32	12	33	30	34	55	36	29	<i>To find the true Amplitude by the Tables.</i>
15	32	16	33	27	34	45	36	11	37	46	39	31	
16	34	39	35	52	37	23	38	57	40	42	42	40	
17	37	05	38	31	40	05	41	49	43	46	45	58	
18	39	36	41	10	42	54	44	49	46	59	49	26	
19	42	11	43	54	45	49	47	57	50	23	53	11	Look for the given Latitude at the Top of the Table, and the Declination in the first Column to the Left-Hand, and in the common Angle of Meeting you will find the Amplitude required, in Degrees and Minutes.
20	44	52	46	41	48	53	51	17	54	02	57	14	
21	47	40	49	41	52	07	54	50	57	59	61	47	
22	50	35	52	56	55	36	58	43	62	26	67	04	
23	53	42	56	20	59	24	63	02	67	36	73	52	
23, 29	55	17	58	04	61	22	65	22	70	33	78	25	

Case 1st. **W**HEN the Latitude and Declination are both given in even Degrees, as for Example. Suppose I would know the Sun's true Amplitude at his Rising in the Latitude of 40.00, his Declination being 17.00 N.

Under Latitude 40, and right against Declination 17, I find 22 26, which is the Sun's true Amplitude, to be counted from the East towards the North, (because it is at his Rising, and the Declination is North) that is, E. 22 26 North.

Case 2d. When the Latitude is given in even Degrees, and the Declination in Degrees and Minutes, as for Example. Suppose I would know the Sun's true Amplitude at his Setting, in the Latitude of 57.00, his Declination being 11 33 S.

Find his Amplitude as before, for the Latitude 57, and for the Declination $\left\{ \begin{array}{l} 11 \text{ deg} \\ 12 \text{ deg} \end{array} \right\}$ which will be $\left\{ \begin{array}{l} 20 \quad 29 \\ 22 \quad 25 \end{array} \right\}$ then

subtract the Less from the Greater, the Diff. is 1 56, or 116 Minutes, to which put two Cyphers, and it makes 11600, which Number must be divided by the Number standing against the odd Minutes of Declination (in the following Table) which in this Case is 181, and the Quotient gives the proportional Parts in Minutes, which Parts are always to be added to the Lesser of the two Amplitudes which you took the Difference of, and the Sum gives the true Amplitude as follows.

$$\begin{array}{r} 181 \overline{) 11600} (64 \text{ proportional Parts in Minutes,} \\ \underline{740} \text{makes 1 Deg. 4 Min.} \\ 10 \end{array}$$

Lesser of the Amplitudes	_____	20	29
Proportional Parts to be added	_____	01	04
True Amplitude	_____	W. 21	33 S.

because at Sun setting, and the Declination South.

Case 3d. When the Declination is given in even Degrees, and the Latitude in Degrees and Minutes, as for Example. Suppose I would know the Sun's true Amplitude at his Rising, in the Latitude 51 14, his Declination being 14.00 S.

Find his Amplitude as before, to 14 Degrees Declination, and for the Latitude $\left\{ \begin{array}{l} 51 \text{ Deg.} \\ 52 \text{ Deg.} \end{array} \right\}$ which will be $\left\{ \begin{array}{l} 22 \quad 37 \\ 23 \quad 08 \end{array} \right\}$ and subtract the Less from the Greater, the Difference is — 0 31 Minutes

To

Rules concerning Amplitudes

123

To the Difference of Amplitudes found on the foregoing Side, which is 31, put two Cyphers, and make it 3100, which must be divided by the Number standing against the odd Minutes of Latitude, (in the following Table) which in this *Case* is 428, and the Quotient gives the proportional Parts in Minutes, to be added to the lesser of the two Amplitudes, as in *Case* the 2d.

428)3100(7 proportional Parts in Minutes.

	104	
Lesser of the Amplitudes	_____	22 37
Proportional Parts to be added	_____	00 07
True Amplitude	_____	E. 22 44 S.

Case 4th. When the Latitude and Declination are both given in Degrees and Minutes, as for Example: Suppose I would know the Sun's true Amplitude at his Setting, in the Latitude 49 18, his Declination being 19 41 N.

First, Find his Amplitude for Latitude 49 Degrees, and Declination 19 41 (as in *Case* 2d) which will be 30 53.

In the same Manner find his Amplitude for Latitude 50 Degrees, and Declination 19 41, which will be 31 35.

Then from the Greater Amplitude	_____	31 35
Subtract the Less	_____	30 53
Remains the Difference	_____	00 42 Minutes.

Put two Cyphers to this Difference, it makes 4200, which must be divided by the Numbers standing right against the odd Minutes of the given Latitude (in the following Table) which in this *Case* is 333, the Quotient gives the proportional Parts in Minutes, to be added to the Lesser of the two Amplitudes, &c.

333)4200(12 proportional Parts

870
204

The Lesser Amplitude	_____	30 53
Proportional Parts to be added	_____	00 12
True Amp. for Lat. 49. 18, and Decl. 19 41 N. W.	_____	31 05 N.

A

A T A B L E of Numbers for finding the proportional Parts to the odd Minutes of Latitude or Declination, in finding the Sun's true Amplitude.

Minutes. Odd	Num- bers	Minutes. Odd	Num- bers.	Minutes. Odd	Num- bers	Minutes. Odd	Num- bers
1	6000	16	375	31	193	46	130
2	3000	17	353	32	187	47	127
3	2000	18	333	33	181	48	125
4	1500	19	316	34	176	49	122
5	1200	20	300	35	171	50	120
6	1000	21	285	36	166	51	118
7	857	22	273	37	162	52	115
8	750	23	261	38	158	53	113
9	666	24	250	39	154	54	111
10	600	25	240	40	150	55	109
11	545	26	230	41	146	56	107
12	500	27	222	42	143	57	105
13	461	28	214	43	139	58	103
14	428	29	207	44	136	59	101
15	400	30	200	45	133		

The Use of this Table is to find a Number to divide the Difference of Amplitudes by, in order to find the proportional Parts, when the Amplitude is required for any Latitude or Declination that is given in Degrees and Minutes, (as in the foregoing Cases) to find which Number, look in some of the Columns under the title of odd Minutes for your given Min. of Latitude or Declination; as suppose for 37 Minutes, and right against that you will find 162, which is the Number required.

To

To find the Variation of the Compass by an Amplitude.

To do this, you must have given both the true and magnetic Amplitudes.

The true Amplitude is to be found by the Tables as before taught.

The magnetic Amplitude is to be found by the Compass, at the Time of the Sun's Rising or Setting, and is so many Degrees or Minutes as you see it rise from the East, or to set from the West, either to the Northward or Southward : As for Example, suppose, being at Sea, I find, by setting the Sun with my Compass, that he rises 10 deg. 15 min. to the Northward of the East, then the magnetic Amplitude is E. 10 15 N. or suppose I find by the Compass, that he sets 14 deg. 12 min. to the Southward of the West, then the magnetic Amplitude is W. 14 12 S.

Then if your Amplitude and magnetic Amplitude are both to the Northward, or both to the Southward, subtract the Less from the Greater, the Remainder is the Variation.

But if one be to the Northward, and the other to the Southward, add them together, and the Sum will be the Variation.

		D.	M.	
<i>Example 1st.</i>	True Amplitude	—	—	E. 18 34 N.
	Magnetic Amplitude	—	—	E. 22 37 N.
	Variation	—	—	04 03 Easterly

<i>Example 2^d.</i>	True Amplitude	—	—	W. 7 11 S.
	Magnetic Amplitude	—	—	W. 2 06 N.
	Variation	—	—	9 17 Westerly

And thus having found how much the Variation is, it remains in the next Place to find which way it is, that is, whether it be Easterly or Westerly.

Rule. If the Amplitude be taken at Sun-rising, and the magnetic Amplitude be farther from the North than the true Amplitude is, then the Variation is Westerly ; but if it be nearer to the North, it is Easterly.

If it be taken at Sun-setting, if the magnetic Amplitude be farther from the North than the true Amplitude is, then the Variation is Easterly, but if nearer to the North, it is Westerly, as may be seen by the two foregoing Examples.

By

By keeping a Journal, is meant, keeping such an Account of the Ship's Way, that at any Time you may be able to know what Latitude and Longitude the Ship is in.

When a Ship is bound from any one Place to another, that lies so far from it, that she is obliged to go out of Sight of Land for any considerable Time, as suppose from *England* to *Barbadoes*, then at the Time she leaves the Land, she is said to take her Departure, and that Part of the Land she then leaves, as suppose the *Start*, the *Lizard*, the *Land's End*, &c. is said to be the Place they take their Departure from; and at the Time of taking such Departure, the Captain or Mate generally takes the Bearing and Distance of that Land, according to his Judgment, and sets it down on the Log-board, or in the Log-book, against the Time it was taken, thus;

Lizard, N. by W. Distance 5 Leagues.

Or, *Start*, NNE. Distance 6 Leagues, &c.

And in the same Manner for any other Place, Bearing and Distance, as you will see in the first Day's Log, in the following Journal.

The Log-book being marked as follows, with Columns for Course, Distance, Northing or Southing, Easting or Westing, Latitude by Dead Reckoning, Latitude by Observation, Meridian Distance, Longitude made, and Longitude in, you are to take Notice.

That in the Column for Course you are always to set down the Course you have made by your Reckoning for those 24 Hours, (that is, from the Noon of the Day before, to the Noon of the Day you work on) the Sea Account being always kept from Noon to Noon.

In the Column of Distance you are to set down the Distance made by your Reckoning for these 24 Hours.

In the Column for Northing and Southing, you are to set down the Difference of Latitude made that 24 Hours, marking the Column with N. if the Difference of Latitude be Northerly, or with S. if it be Southerly.

In the Column of Easting or Westing, you are to set down the Departure made that 24 Hours, marking the Column with E. if the Departure be Easterly, or with W. if it be Westerly.

In the Column marked Lat. by D. R. you are to set down the Latitude you reckon yourself in on that Day.

In

In the Column marked Lat. by Obs. you are to set down the Latitude you find yourself to be in by Observation, if you have one, if not, then let it stand open.

In the Column for Mer. Dist. you are to set down (in Degrees and Minutes) how much Departure you have made in all from the Place you took your Departure from.

In the Column of Long. made, you are to set down (in Degrees and Minutes) how much Difference of Longitude you have made in all from the Place you took your Departure from.

In the Column of Longitude in, you are to set down what Longitude you find yourself to be in on that Day by your Reckoning.

Note, The Account of Longitude made, being what is always kept in his Majesty's Navy; and the Account of Longitude in, being most generally kept on board the Merchant Ships: I shall in this Treatise shew how to keep them both, and shall leave it to the Practitioners Choice which he will make Use of, they both being equally true, and there being no Occasion to keep more than one of them.

And now having (I think) given a sufficient Account of Things that are to be set down in the different Columns, I shall lay down these few necessary Rules following, and then proceed to shew how they are all to be found, or the Method of working a Day's Work at Sea.

Rule 1st. Variation, if there be any (as most certainly there is) must be allowed upon all Courses steered, and upon all Bearings, &c. that are taken by the Compass, that is, if it be the Easterly Variation, it must be allowed to the Right Hand; but if Westerly Variation, then to the Left Hand of the Course or Bearing: Suppose yourself placed in the Centre of the Compass, and looking directly forward to the Point you are to allow the Variation from.

Example. Suppose I steer S.W. and there is one Point Westerly Variation, then my true Course will be S.W. by S. or suppose I set a Point of Land, and find it to bear by my Compass E.S.E. and I know there is half a Point Easterly Variation, then the true Bearing is SE. by E. $\frac{1}{2}$ E.

Rule 2^d. Lee-way (which I need not here describe, being sufficiently known to every Seaman) must be allowed to the Right Hand of the Course steered, when the Larboard Tacks are Aboard, and to the Left-Hand when the Starboard Tacks are Aboard.

Example

Example. Suppose I steer NE by E. with the Larboard Tacks aboard, and make one Point Lee-way, then my Course made good is ENE.

Rule 3d. Lee-way and Variation, when they are both to be allowed one Way, that is, both to the Right-Hand, or both to the Left, add them together, and allow their Sum the same Way they were to be allowed.

But if they are to be allowed, one to the Right-Hand, and the other to the Left, subtract the Less from the Greater, and allow the Remainder the same Way as the Greater of them was to be allowed.

Example. Suppose I steer NNW. with my Starboard Tacks aboard, and make one Point Lee-way, there being at the same Time half a Point Westerly Variation, I would know my true Course?

Lee way to the Left-Hand _____ 1 0 Point

Variation to the Left-Hand _____ 0 $\frac{1}{2}$ Point

Their Sum to be allowed to the Left-Hand $\frac{1}{2}$ Points, makes the true Course NW. by N. $\frac{1}{2}$ W.

Example 2d. Suppose I steer SW. by W. with my Larboard Tacks aboard, and make $2\frac{1}{2}$ Points Lee-way, and I have $1\frac{1}{4}$ Points Westerly Variation, what is my true Course?

Lee-way to the Right-Hand _____ $2\frac{1}{2}$ Points

Variation to the Left-hand _____ $1\frac{1}{4}$

The Remainder to be allowed to the Right-Hand $1\frac{1}{4}$ Points, makes the true Course WS W. $\frac{1}{4}$ W.

Rule 4th. When a Ship is lying too under a Mainfail, Mizzen, &c. then observe how she comes up and falls off, and take the Middle between the two Points, and from that allow the Lee-way and Variation, as in Rule 3d.

Example. Suppose a Ship lying too under a Main fail, with the Starboard Tacks aboard, comes up E. by S. and falls off to NE. by E. there being one Point Westerly Variation, and she makes 5 Points Lee-way, what Course does she make good?

The Middle between E. by S. and NE. by E. is E. by N. from which allowing six Points to the Left-Hand, by Rule 3d, the true Course will be N. by E.

Rule 5th. Currents, the Way they set you, and the Distance you suppose you are driven by them, is to be set down in the Traverse Table for the Day, as any other Course or Distance.

Example

Example. Suppose I try the Current, and find it to set W. by N. *per* Compass 1 Mile *per* Hour, the Variation being one Point Easterly, then if I sail in that Current 24 Hours, I set down in the Traverse Table, as a Course, WNW. distant 24 Miles.

Rule 6th. Heave of the Sea is to be accounted for in the same Manner as Currents: As suppose there is a great Sea heaving toward the SW. by my Compass, there being $\frac{1}{2}$ Point Westerly Variation, I then set down in my Traverse-Table SW. by S. $\frac{1}{2}$ W. with so much Distance as I judge the Sea has heaved the Ship.

Rule 7th. At leaving the Land, the opposite Point to the Bearing (with the Variation allowed upon it) and the Distance you judge yourself from it, must be set down in the Traverse-Table, as a Course and Distance.

Example. Suppose having $\frac{1}{4}$ Westerly Variation, the *Start* bears by my Compass NNE. distant 4 leagues, the opposite Point to NNE. is SSW. which with the Variation makes S. $\frac{3}{4}$ W. for the Course to be set in the Traverse Table, distant 12 Miles.

Rule 8th. When you make the Land, the Bearing itself (with the Variation allowed upon it) and the Distance you judge yourself from it, are to be set in the Traverse-Table, as a Course and Distance: This needs no Example.

Note, If you keep only the Account of Longitude made, and would at any Time know what Longitude you are in, look out the Longitude of the Place you took your Departure from, and with that Longitude, and the Longitude made, taken as Difference of Longitude, find the Longitude come into, by the Rules in Page 107, and 108. And the Longitude so found must be counted from the same Meridian that the Tables you looked out the Longitude of the Place departed from, counts it.

RULES to correct the Dead-Reckoning by an Observation.

WHEN you have made all the proper Allowances you can, such as for Variation, Lee-way, Currents, &c. and still find that your Latitude by Dead Reckoning will not agree with the Latitude by Observation, within five Minutes, then you must correct as follows.

C A S E the First.

If your Course found by Dead Reckoning be due North, or due South.

Rule. First find the Difference of Latitude (in Miles) between the last Observation, and the Observation on the Day you correct, which will be the true Difference of Latitude, then will your true Course be the same as the Course by Dead-Reckoning. Your true Distance the same as the true Difference of Latitude. Your Departure co, and your Meridian Distance, Longitude made, (or Longitude in) will be the same as they were on the Day you had the last Observation.

C A S E the Second.

If the Course found by Dead-Reckoning be less than three Points, or less than thirty-three Degrees.

Rule, First find the Difference of Latitude (in Miles) between the last Observation, and the Observation on the Day you correct, which will be the true Difference of Latitude. Then make your true Course the same as the Course found by Dead-Reckoning, since the last Observation, and with that Course, and the true Difference of Latitude, find the true Distance and Departure, (*as in Plane Sailing Case the 2d. Page 48.*) then to find the Meridian Distance, the Longitude made, and the Longitude in, take the following Rule.

N.B. The Difference of Longitude is to be found by the true Course, and the Meridian Difference of Latitude between the two Observations (as usual) and the Meridian Distance, Longitude made (or Longitude in) are to be found by adding, or subtracting the true Departure and Difference of Longitude to, or from the Meridian Distance, Longitude made (or Longitude in) on the Day you had the last Observation, which is the Day you always correct from.

C A S E

C A S E the Third.

If the Course found by Dead Reckoning be more than three Points, or more than thirty-three Degrees, and less than 6 Points, or 67 Degrees and a Half.

Rule, First find the Difference of Latitude in Miles between the last Observation, and the Observation on the Day you correct, which will be the true Difference of Latitude: Then with the Course found by Dead-Reckoning, since the last Observation, and the true Difference of Latitude, find a new Departure (*by the second Case of Plane Sailing, Page 48.*) add this new Departure to the Departure found by Dead Reckoning since the last Observation, and take half their Sum for your true Departure: Then you have given the true Difference of Latitude and Departure to find your true Course and Distance, (*by Plane Sailing, Case the 6th*) read here *N.B.* in Case the 2d.

C A S E the Fourth.

If the Course found by Dead Reckoning be more than six Points, or sixty-seven Degrees and Half.

Rule, First find the Difference of Latitude in Miles between the last Observation, and the Observation on the Day you correct, which will be the true Difference of Latitude, and make your true Departure the same as the Departure found by Dead Reckoning since the last Observation: Then you have given the true Difference of Latitude and Departure, to find the true Course and Distance, (*by Plane Sailing, Case 2d.*) read here *N.B.* in Case 2d.

Note, As the Knowledge of which Case you are to correct by, depends upon knowing your Course by Dead Reckoning, and as when you correct only for one Day, that Course is always found by the Difference of Latitude and Departure in your Traverse Table for that Day; therefore if you are to correct for a longer Time than one Day, you must take the Northing, Southing, Easting, and Westing, that you have made for every Day since the last Observation, (or if it be your first Observation, then for every Day from your leaving the Land) minding not to leave out the Difference of Latitude and Departure for the Day you are correcting on, and bringing them into a Traverse Table; by which you will find the whole Difference of Latitude and Departure, made by Dead-Reckoning since the last Observation, and with that same Difference of Latitude and Departure, find

find the Course made by Dead-Reckoning, then observe which of the foregoing Cases that Course comes under, and correct by the Rules for that Case, finding every Thing except the Distance.

And when you have so corrected, you are to set down in your Book only the Latitude by Dead Reckoning, the Latitude by Observation, the Meridian Distance, and the Longitude made (or Longitude in) and rub out the Course, Difference of Latitude and Departure.

Then you have given the Latitude by Observation on the Day you correct, and the Latitude by Dead Reckoning on the Day before it, to find the Difference of Latitude for the last 24 Hours (by the Rules for Latitude, Page 105.) Also the Meridian Distance on the Day you correct, and the Meridian Distance on the Day before it, to find your Departure, (by subtracting the lesser from the greater, if they are both East, or both West; or by adding them together, if one be East and the other West.) And with that Difference of Latitude and Departure find your Course and Distance, (by the 6th Case of Plane Sailing) which Course, Distance, Difference of Latitude and Departure are to be set down instead of those you rubbed out.

Rules to find the Meridian Distance.

Case 1st, If the Meridian Distance on the Day you work from the East, and you have sailed to the Eastward; or if it be West, and you have sailed to the Westward, then add the Departure to the Meridian Distance, and the Sum will be the Meridian Distance you have made, of the same Name with that you worked from.

Example. Meridian Distance ————— 4 18 W.
 Departure Westerly 97 Miles, or ———— 1 37
 Meridian Distance made in all ————— 5 55 W.

Case 2d, If your Meridian Distance be East, and the Departure be Westerly; or if the Meridian Distance be West, and Departure Easterly, then subtract the Less from the Greater, the Remainder will be the Meridian Distance you have made, of the same Name with the Greater of the two.

Example 1st. Meridian Distance ————— 7 34 W.
 Departure Easterly ————— 1 16
 Meridian Distance made in all ———— 6 18 W.

Example 2d, Meridian Distance ————— 1 34 W.
 Departure Easterly ————— 3 17
 Meridian Distance made in all ———— 1 43 E.

48
18
240
40
720
240

A

JOURNAL

OF

A VOYAGE from ENGLAND

TOWARDS

MADDEIRA.

H.	K.	H K F.	Courses	Winds	Lee-way	Transactions, Thursday, May the 11th, 1780.			
2						Moderate Gales, and fair Weather, at 6 (p. m.) the <i>Start</i> bore as per Long. from which I take my Departure, it being in the Latitude 50.7 N. and Long. of 3.45 W. from <i>London</i> . Variation $\frac{1}{4}$ Point Westerly.			
4									
6	The	<i>Start</i>	N by E.	Dist 6 Le	ag.				
8	4		SW by W	N E					
10	4	I							
12	5								
2	5	I							
4	5	I	S W						
6	5								
8	5	I							
10	5	I							
12	6								
Courfe	Dist.	S	W	Lat by DR	Lat. by Ob	Mer. Dist.	Lon. made	Lon. in	
S 33 00 W	108	93	53	48 34 N		00 53 W	01 22 W	05 07 W	

The Manner of working this Day's Work.

The opposite Point to the Bearing of the Land is S. by W. which with the Variation allowed upon it (as before taught) makes S. $\frac{1}{4}$ E. and the Distance from the Land 6 Leagues, or 18 Miles, which are to be set down for the first Course and Distance in the following Traverse-Table.

Then the first Course steered being S. W. by W. the Variation allowed upon it will make it SW. by S. $\frac{3}{4}$ W. and the Sum of all the Distances from 8 o'Clock, where that Course begins, to 2 o'Clock where it ends, being 18 Miles and a Half, I double that Sum, because the Book is marked only for every two Hours, and it makes 37 Miles for the Distance belonging to that Course. But if the Book had been marked for every Hour, as it is in the *Navy*, and aboard the *East India Ships*, then I must have taken the Sum without doubling it for the Distance, and in the same Manner I reckon the other Course and Distance; all which will be as in the following Traverse-Table.

And then every Thing being found as on the other Side, I set them down in their proper Columns as above.

Course

The Traverse - Table.

135

Courses	Dist.	N.	S.	E.	W.
S. $\frac{1}{4}$ E.	18		18.0	0.9	
SW by S. $\frac{3}{4}$ W.	37		27.4		24.8
SSW $\frac{3}{4}$ W.	56		48.0		28.8
Diff. of Latitude South			93.4	0.9	53.7
					0.9
					52.7 Dep. W.

The several Courses and Distances in this Table being looked out and cast up as in the Rules for Traverse Sailing (Page 52,) I find my Difference of Latitude to be 93 Miles and 4 Tenths, and my Departure 52 Miles 7 Tenths; then I mark down (upon my Slate, or the Paper that I work upon) every Thing that is to be found, and as I find what they come to, I set against them as follows:

By	Courfe	S. 30 00 W.	Because the Diff. of Lat. is S. and the Dep. W.
	Distance	108 Miles	Note, When the Tenths in any Side are more
	Diff. of Lat.	93 S.	than 5, or half a Mile, you must call that Side
	Departure	53 W.	1 Mile more than you found it to be; but when
D.R.	Latitude by D.R.	48 — 34 N.	they are less than 5, then you need take no No-
	Lat. by Observation		tice of them. As in this Case the Diff. of Lat.
	Meridian Dist	— 00 53 W.	being 93.4 I reject the 4th Tenths, and call it only
	Longitude made	— 01 22 W.	93 Miles, and the Dep. being 52.7 instead of the
	Longitude in	— 05 17 W.	7 Tenths I put 1 Mile to it, and call it 53 Miles.

But when you take the Difference of Latitude and Departure to find the Course by, then take them in Miles and Tenths.

Then in the first Place, with my Difference of Latitude 93.4, and my Departure 52.7, (as taught in Plane Sailing, Case the 6th) I find my Course to be 30 Degrees, and my Distance 108 Miles, which I set down against Course and Distance as above.

Second, For the Latitude by D. R.	Third, For the Meridian Distance.
Take the Latitude failed from — 50 07 N.	Note, the Meridian Distance on the first
And the Diff. Lat. 93 Miles, or — 1 33 S.	Day's Work, is always the same as that Day's
Sub. (as per Rule) gives Lat. D.R. 48 34 N.	Dep. which here is 0.53 W.

Fourth, For the Difference of Longitude.	Then I look for my Course 30 Degrees,
The Meridional Parts of — } 3485	in the Tables of Diff. of Lat. and Dep. and
The Latitude failed from — } 3343	for the Meridian Diff. of Lat. 142, in some
Of the Lat. by D. R. —	of the Diff. of Lat. Columns belonging to that
Meridional Difference of Latitude 142	Course, the Dep. 82, which answers to that
	Diff. Lat. is my Diff. Long.

Fifth, for the Longitude made.	Sixth, For the Longitude in.
The Longitude made on the first Day's	Take the Longitude failed from 3° 45' W.
Work, is always the same as that Day's	And the Diff. Long. 82 Miles, or 1 22 W.
Diff. of Long. which here is — 1 22 W.	Sub. (as per Rules) gives Long. in 5 7 W.

H.	K.	H	K	F.	Courses	Winds	Lee-way	Transactions, Friday, May the 12th, 1780.	
2	6				SWbW	N		Moderate Gales and fair Weather, at 8 (a m.) saw a Ship to the Northward.	
4	5	I				N W			
6	5								
8	5								
10	4	I			S W				
12	4	I							
2	4	I				WNW		Variation $\frac{1}{4}$ Point Westerly.	
4	4	I							
6	4	I							
8	5				SWbyS				
10	4	I							
12	4								
Course	Dist.	S	W	Lat by DR	Lat. by Ob	Mer. Dist	Lon. made	Lon. in	
S 33 $^{\circ}$ 00' W	114	96	61	46 58 N		1 54 W	2 55 W	6 40 W	

The Variation being allowed, and the Distances summed up as before, the Traverse-Table will be as follows.

Courses	Dist.	N.	S.	E.	W.
SW by S $\frac{1}{4}$ W	43		31 9		28
SSW $\frac{3}{4}$ W	45		38 6		23.1
S by W $\frac{3}{4}$ W	27		25 4		9.1
Diff of L t. 95 9 Dep 61					

First, With my Difference of Lat. 95.9, and Departure 611, (by Plane Sailing, Case 6,) I find my Course to be 33 Deg. and my Distance 144 Miles.

Second, For my Latitude by D.R.

Take the Latitude in yesterday 48 34 N.
And my Diff. of Lat. 96 Miles or 1 36 S.

Gives the Latitude by D. R. — 46 58 N.

Third, For the Meridian Distance.

Take the Mer. Dist. yesterday — 0 53 W.
And the Departure to day — 1 01 W.

Gives the Meridian Distance — 1 54 W.

By	Course —	S. 33 00 W.
	Distance —	114 Miles
D.R.	Difference of Lat. —	96 S.
	Departure —	61 W.
D.R.	Lat. by D. R. —	46 58 N.
	Lat. by Observation —	
D.R.	Meridian Distance —	1 54 W.
	Longitude made —	2 55 W.
D.R.	Longitude in —	6 42 W.

Fourth, For the Diff. of Longitude.

Take the Mer. Parts of yest. Lat. — 3340
And of the Latitude to-day — 3200

Gives the Mer. Diff. of Latitude — 143
with which, and the Course (as in the first Day's Work) I find my Diff. of Longitude to be 93 Miles West.

Fifth, For the Longitude made.

Take the Long. made yesterday — 1 22 W.
And the Diff. of Long. to-day } 1 33 W.
93 Miles, or —

Gives the Long. made to-day — 2 55 W.

Sixth, For the Longitude in.

Take the Long. in yesterday — 5 07 W.
And the Diff. of Long. to-day — 1 33 W.

Gives the Longitude in — 6 40 W.

H.	K.	HK	F.	Courses	Winds	Lee-way	Transactions, Saturday, May the 13th, 1780.		
2	4			SW	WNW		Moderate Gales, and Cloudy.		
4	4								
6	4								
8	4	I		SW b S	W by N	$\frac{1}{2}$			
10	4	I					Variation 1 Point Westerly.		
12	4	I							
2	4	I		In 1st Reef both Topfails					
4	4			SSW	W	I			
6	4								
8	4								
10	4								
12	4								
Courfe	Dist.	S	W	Lat by DR	Lat by Ob	Mer. Dist.	Lon. made	Lon. in	
S 14 00 W	97	95	24	45 23 N.		2 18 W.	3 29 W.	7 14 W.	

The Leeway and Variation being allowed, as before taught, the Traverse-Table will be as follows.

Courses	Dist.	N.	S.	E.	W.
SW by S	24		20.0		13.3
S by W $\frac{1}{2}$ W	36		34.5		10.4
South	40		40.0		
			95.5		23.7

By {
D.R. { Course—S. 14 00 W.
Distance — 97 Miles
Difference of Lat. 95 S.
Departure — 24 W.
Lat. by D.R.—45 23 N.
Lat. by Obser.—
Meridian Dist.—2 18 W.
Longitude made 3 29 W.
Longitude in—7 14 W.

First, The Course and Distance found (by Plane Sailing Cafe 6) as before, will be as in the other Column.

Second, For my Latitude by D.R.
Take the Latitude in yesterday 46 58 N.
And the Diff. of Latitude 95 } 1 35 S.
Miles —————
Gives the Latitude by D.R. — 45 23 N.

Third, For the Meridian Distance.
Take the Mer. Dist. yesterday 1 54 W.
And the Departure to-day — 0 24 W.
Gives the Meridian Distance—2 18 W.

Fourth, For the Diff. of Longitude.
The Mer. Parts of yesterday's Lat. — 3200
Of to-day's Latitude ————— 3063
The Mer. Diff. of Latitude ————— 137
with which, and the Course (as before) I find
the Diff. of Long. to be 34 Miles West.

Fifth, For the Longitude made.
Take the Long. made yesterday—2 55 W.
And the Diff. of Long. to-day—0 34 W.
Gives the Longitude made ————— 32 9 W.

Sixth, For the Longitude in.
Take the Long. in yesterday—6 40 W.
And the Diff. of Long ————— 0 34 W.
Gives the Longitude ————— 7 14 W.

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H.	K.	H K	F.	Courses	Winds	Lee-way	Transactions, Sunday, May May the 14th, 1780.		
2	4			S	WSW	1	Moderate Gales, and hazy the first Part, the latter fresh Gales, and Rain.		
4	4								
6	4	1							
8	4			In 2d Reef both Topfails					
10	4			SSE.	SW.	1 $\frac{1}{2}$			
12	4								
2	4						Variation 1 Point Westerly.		
4	4								
6	4			Handed the Fore Topfail					
8	4			S by E.	SWbW	2			
10	4								
12	3	1			Tack'd				
Courfe	Dist.	S	E.	Lat by DR	Lat by Ob	Mer. Dist.	Lon. made	Lon. in	
S 39 00 E	93	72	60	44 11 N.		1 18 W.	2 07 W.	5 52 W.	

The Ship having her Starboard Tacks aboard, when the Leeway and Variation are allowed, (as before taught) the Traverse-Table will stand as follows :

Courses	Dist.	N.	S.	E.	W.
SSE.	33		30.5	12.6	
SE $\frac{1}{2}$ E.	40		25.4	30.9	
SE.	23		16.3	16.3	
			72.2	59.8	

By	Courfe—	S. 39 00 E.
	Distance —	93 Miles
D.R.	Difference of Lat.	72 S.
	Departure —	60 E.
	Lat. by D.R.—	44 11 N.
	Lat. by Obfer.—	
	Meridian Dist.—	1 18 W.
	Longitude made	2 07 W.
	Longitude in—	5 52 W.

Having been very particular in explaining the Manner of working a Day's Work, (in the three foregoing Days) and as all Day's Works, where there is no Correction wanting, are to be worked from the Difference of the Latitude and Departure found by the Traverse-Table, (as before) I have only set down the Traverse-Table, and what all the other Things come to, and have left the finding them to exercise the Learner.

A Journal from *England* towards *Madeira*. 139

H.	K.	H K F.	Courses	Winds	Lee-way	Transactions, Monday, May the 15th, 1780.		
2	4		NW b W	SW b W	2	Fresh Gales, and Rain all these 24 Hours.		
4	3							
6	3							
8	3				3			
10	3		Hand Main Topfail			Variation 1 Point Westerly.		
12	3	I	NW	WSW	3			
2	3	I						
4	3	I						
6	3							
8	3							
10	3		NW b N	W by S	3½			
12	3							
Courfe	Dist.	S. W	Lat by DR	Lat. by Ob	Mer. Dist.	Lon. made	Lon. in	
N 29 00 W	75	65 36	45 16 N.	—	1 54 W	3 00 W	6 45 W	

The Ship having her Larboard Tacks aboard, when the Leeway and Variation allowed, the Traverse-Table will stand as follows :

Courses	Dist.	N.	S.	E.	W.
NW	32	22.6			22.6
NNW	33	30.5			12.6
N ½ W	12	11.9			1.2
		65.0			36.4

By D.R.	{	Courfe — N. 29 00 W.
		Distance — 75 Miles
		Diff. of Lat. — 65 N.
		Departure — 36 W.
		Lat. by D.R. — 45 16 N.
		Lat. by Obser. —
		Meridian Dist. — 1 54 W.
		Longitude made 3 08 W.
		Longitude in — 6 45 W.

To find the Course.

Note, In this Case the Difference of Latitude being just 69 Miles without any Tenths, after you have put two Cyphers to the Departure, you must not divide it by 65, but by 650, the Figures being put to supply the Place of Tenths, as directed in the Rule for Plain Sailing.

$$\begin{array}{rcl}
 \left. \begin{array}{l} \text{Diff. Lat.} \\ 650 \end{array} \right\} \text{D. with Cyphers} & \begin{array}{r} 3640 \\ 3900 \\ \hline \end{array} & \begin{array}{l} 56 \text{ the} \\ \end{array}
 \end{array}$$

....

Natural Tang. of the Course answering to 29d. 15m. or (neglecting the 15m. 29d. N.W.erly)
T 2
H.

H.	K.	H	K	F.	Courfes	Winds	Lee-way	Transactions, Tuesday, May the 16th, 1780.		
2	3				WNW	S W	3½	Hard Gales, and Squally, with Rain.		
4	3				Handed the Forefail					
6	3									
8	Lay-too, up NW. off N.						5			
10	Drift 1½ Miles per Hour.									
12										
2					UpNbyW. offNE byN					
4										
6										
8					UpNNW offNNE Set the Forefail					
10										
12										
Courfe		Dist.		N	E	Lat by DR	Lat. by Ob	Mer. Dist.	Lon. made	Lon. in
N 8 00 E		35	34	5	45	50 N		1 49 N	2 53 W	6 38 W

Having allowed the Leeway, and the Variation upon the first Courfe, and alfo from the Middle between what ſhe comes up and falls off, (as taught in the Rules for laying too,) The Traverse-Table will ſtand as follows.

Courfes	Dist.	N.	S.	E.	W.
NWbW½W	18	13.9			11.4
NNE	12	11.1		4.6	
NE by E	9	5.0		7.5	
NE	6	4.2		4.2	
		34.2		16.3	11.4
				11.4	

Departure 4.9 E.

By	Courfe	N. 8 00 E.
	Distance	35 Miles
	Difference of Lat.	34 N.
	Departure	5 E.
D.R.	Lat. by D.R.	45 50 N.
	Lat. by Obfer.	
	Meridian Distance	1 49 N.
	Longitude made	2 53 W.
	Longitude in	6 38 W.

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H.	K.	H K F.	Courses	Winds	Lee-way	Transactions, Wednesday, May the 17th, 1780.			
2	3		N W	W S W	4	Fresh Gales the first Part, the latter moderate, with small Showers.			
4	3		WNW	S W					
6	3								
8	3		Set Main Topfail						
10	3	I	N W	W S W	3				
12	3	I							
2	3	I	Set Fore Topfail			Variation 1 Point Westerly.			
4	4		W by S	S by W	2				
6	4								
8	4								
10	4		Out 2d Reef both Topfails						
12	4	I	W	SSW	1 1/2				
Course	Dist.	S.	W	Lat by D.R.	Lat. by Ob.	Mer. Dist.	Lon. made	Lon. in	
N 54 00 W	72	42	58	46 32 N.		2 47 W	3 00 W	8 02 W	

Courses	Dist.	N.	S.	E.	W.
N by W	12	11.8			2.3
NW by N	12	10.0			6.7
N N W	21	19.4			8.0
W	32				32.0
W by N 1/2 W	9	0.9			9.0
		42.1			58.0

By D, R.	Course	N. 54 00 W.
	Distance	72 Miles
	Diff. of Lat.	42 N.
	Departure	38 W.
	Lat. by D. R.	46 32 N.
	Lat. by Obser.	
	Meridian Dist.	2 47 W.
	Longitude made	4 07 W.
	Longitude in	8 02 W.

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H.	K.	H K F	Courfes	Winds	Lee-way	Tranfactions, Thurfday, May the 18th, 1780.		
2	4	I	W by N	SW b S	I	Moderate Gales, and thick hazy Weather.		
4	4	I	Out 1ft Reef both Topfails					
6	4							
8	4	I	W	S S W	$\frac{1}{2}$			
10	4	I						
12	4	I						
2	4		W by S	S by W		Variation 1 Point Wefterly.		
4	4							
6	4							
8	4							
10	3	I	W S W	S				
12	3							
Courfe	Diff.	S	W	Lat by DR	Lat. by Ob	Mer. Diff.	Lon. made	Lon. in
S 82 00 W	95	13	95	46 19 N		4 22 W	6 33 W	10 18 W

Courfes	Diff.	N.	S.	E.	W.
W by N	26	5.1			25.5
W b S $\frac{1}{2}$ W	27		2.6		26.9
WSW $\frac{1}{2}$ W	32		9.3		30.6
SW b W $\frac{1}{2}$ W	13		6.1		11.5
		5.1	18.0		94.5

Diff. of Latitude 12.9

By { Courfe — S. 82 00 W.
Distance — 95 Miles
Difference of Lat. 13 S.
Departure — 95 W.
D.R. { Lat. by D R — 46 19 N.
Lat. by Obser. —
Meridian Distance 4 22 W.
Longitude made 6 33 W.
Longitude in — 10 18 W.

A Journal from *England* towards *Madeira*. 143

H.	K.	H	K	F.	Courfes	Winds	Lee-way	Tranfactions, Friday, May the 19th, 1780.
2	2	1			WSW	S		Little Wind, and small Showers of Rain.
4	2	1						
6	2	1						
8	2							A great Swell from the SW. for which I allow 6 Miles.
10	2							
12	2							
2	1	1			SW ^b W	S by E		Variation $\frac{3}{4}$ Point Westerly.
4	1	1						
6	1	1						
8	1							
10		1						
12		1						
Courfe	Diff.	S	W	Lat by DR	Lat. by Ob	Mer. Diff.	Lon. made	Lon. in
S 57 00 W	34	19	29	46 00 N		4 51 W	7 15 W	11 00 W

Courfes	Diff.	N.	S.	E.	W.
SW by W	30		16.7		24.9
S W	10		7 1		7.1
NE by N	6	5.0		3.3	
		5.0	23.8	3.3	32.0
			5.0		3.3
			18.8		28.7

Cor- rected	Courfe	— S. 57 00 W.
	Distance	— 34 Miles
	Difference of Lat.	19 S.
	Departure	— 29 W.
	Latitude by D.R.	46 00 N.
	Lat. by Obfer.	—
	Meridian Distance	4 51 W.
	Longitude made	7 15 W.
	Longitude in	11 00 W.

Note, In this Day's Work the Swell coming from the S.W. leaves the Ship towards the N.E. and the Variation allowed upon it makes N.E. by N. for the laft Courfe in the Traverse-Table.

H.

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H.	K.	H	K	F.	Courses	Winds	Lee-way	Transactions, Saturday, May the 20th, 1780.	
2					Calm			Tried the Current, and found it to be set WSW. 1 Mile per Hour, at which Rate I allow it for this 24 Hours.	
4									
6									
8									
10								Zenith Distance ——— 27 52 S. Declination ——— 17 41 N.	
12									
2									
4								Variation 1 Point Westerly.	
6									
8	1				S S W.	W			
10	2								
12	2	1							
Courfe	Dist.	S	W	Lat by DR	Lat. by Ob	Mer. Dist.	Lon. made	Lon. in	
S 42 00 W	32	24	22	45 36 N	45 33 N	5 13 W	7 50 W	11 35 W	

Courses	Dist.	N.	S.	E.	W.
S by W	11		10.8		2.1
SW by W	24		13.3		20.0
			24.1		22.1

Courfe — S. 42 00 W.
 Distance ——— 32 Miles
 Difference of Lat. 24 S.
 Departure ——— 22 W.
 Latitude by D. R. 45 36 N.
 Lat. by Obser. — 45 33 N.
 Meridian Distance 5 13 W.
 Longitude made 7 50 W.
 Longitude in — 11 35 W.

Note, The Current setting WSW. 1 Mile per Hour, I allow the Variation upon it, which makes it SW. by W. and set it in the Traverse-Table, with 24 Miles Distance as above.

H.	K.	H K F.	Courses	Winds	Lee-way	Tranfactions, Sunday, May the 21 st , 1780.
2	3		S by W	W by S		Moderate Gales and fair Weather, at 9 (a. m.) spoke with a Ship from Barbadoes, and bound for London.
4	3	1				
6	4					
8	4					
10	4					
12	4					
2	4					
4	4					
6	4					
8	4					
10	4					Variation 1 Point Westerly.
12	4					

Courſe	Diff.	S	—	Lat by DR	Lat. by Ob	Mer. Diff.	Lon. made	Lon. in
South	103	103	—	44 00 N	43 50 N.	5 13 W	7 50 W	11 35 W

By { Courfe ——— South
D.R. { Distance ——— 93
since last { Diff. of Lat. ——— 93
Obfer. { Departure ——— 00
{ Lat. by D.R. ——— 44 00 N.
{ Latitude by Obfer. 43 50 N.

Cor- { Courfe ——— South
rected { Distance ——— 103 Miles
{ Difference of Lat. 103 S.
{ Departure ——— 00
{ Latitude by D.R. 44 00 N.
{ Lat. by Obfer. — 43 50 N.
{ Meridian Distance 5 13 W.
{ Longitude made 7 50 W.
{ Longitude in — 11 35 W.

In this Day's Work, there being 10 Miles Difference between the Latitude by Dead-Reckoning and Observation, I am to correct, and therefore I do not find the Meridian Distance, &c. by (D.R.) as I did when there was no Correction; but I mark them all down again as above, and correcting (as in Case the First, of the Rules for correcting) because my Course by D.R. since the last Observation was due South, I set them all down as in the above Correction.

H.	K.	H K F.	Courses	Winds	Lee-way	Transactions, Monday, May the 22d, 1780.			
2	4		SW b S	WNW		Moderate Gales and fine clear Weather.			
4	4	1							
6	4	1							
8	4	1							
10	4								
12	4								
2	4	1	S S W			Variation 1 Point Westerly.			
4	4	1							
6	4								
8	4								
10	4								
12	4	1							
Courfe	Dist.	S. W	Lat by DR	Lat. by Ob	Mer. Dist.	Lon. made	Lon. in		
S 18 00 W	112	106 35	42 13 N.	42 04 N	5 48 W	8 37 W	12 24 W		

Courses	Dist.	N.	S.	E.	W.
S S W	60		55.4		23.0
S by W	42		41.2		8.2
			96.6		31.2

Cor-
rected

Courfe	—	S. 18 00 W.
Distance	—	112 Miles
Difference of Lat.	—	106 S.
Departure	—	35 W.
Latitude by D. R.	—	42 13 N.
Lat by Obser	—	42 04 N.
Meridian Distance	—	5 48 W.
Longitude made	—	8 37 W.
Longitude in	—	12 24 W.

By	Courfe	—	S. 18 00 W.
D. R.	Distance	—	102 Miles
since	Diff of Lat.	—	97 S.
last	Departure	—	31 W.
Obfer	Latitude by D. R.	—	42 13 N.
vation	Latitude by Ob.	—	42 04 N.

Having found as far as to the Latitude by Dead-Reckoning and Observation, I see they differ 9 Miles, therefore I correct (by Case the 2d) because my Course found by Dead-Reckoning since the last Obser. is less than 33 Degrees, and the Result is as above.

H.	K.	H K	F.	Courses	Winds	Lee-way	Transactions, Tuesday, May the 23d, 1780.		
2	4			SW	NW		Moderate and Fair.		
4	4	I							
6	4								
8	4								
10	3	I		SWbW					
12	4								
2	4								
4	3	I			N				
6	3	I							
8	3	I					Variation $\frac{3}{4}$ Point Westerly.		
10	3	I			NE.				
12	3	I							
Course	Dist.	S	W	Lat by DR	Lat by Ob	Mer. Dist.	Lon. made	Lon. in	
S 47 00 W	78	53	57	40 59 N.	41 11 N.	6 45 W.	9 53 W.	13 38 W	

Courses	Dist.	N.	S.	E.	W.
SWbS $\frac{1}{4}$ W	33		26.5		19.7
SW $\frac{1}{4}$ W	58		38.9		43.0
			65.1		62.7

Corrected	Course	S. 47 00 W.
	Distance	78 Miles
	Difference of Lat.	53 S.
	Departure	57 W.
	Lat. by D. R.	40 59 N.
	Lat. by Obser.	41 11 N.
	Meridian Dist.	6 45 W.
	Longitude made	9 53 W.
	Longitude in	13 38 W.

By D. R. since last Obser.	Course	S. 44 00 W.	New Departure	51
	Distance	91 Miles	Departure by D. R.	63
	Difference of Lat.	53 S.		
	Departure	63 W.	Their Sum	114
	Latitude by D. R.	40 59 N.		
	Lat. by Obser.	41 11 N.	$\frac{1}{2}$ Sum, or true Dep.	57 Miles

In this Case, the Course by D. R. since the last Observation, being more than 33, and less than 67 Degrees, I correct by Case the 3d.

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H.	K.	H K	F.	Courses	Winds	Lee-way	Transactions, Wednesday, May the 24th, 1780.		
2	4			W	S E		Cloudy the first Part, the latter moderate and fair.		
4	4								
6	4								
8	4								
10	4								
12	4				E.				
2	4						Variation $\frac{1}{2}$ Point Westerly.		
4	4								
6	4								
8	3	I							
10	3	I							
12	3	I			NNE.				
Course	Dist.	—	W	Lat by DR	Lat by Ob	Mer. Dist.	Lon. made	Lon. in	
West	93	—	93	41 02 N.	41 11 N.	8 18 W.	11 56 W.	15 41 W.	

Courses	Dist.	N.	S.	E.	W.
W b S $\frac{1}{2}$ W	93		9.1		92.6
		Diff. Lat.			Dep

Corrected by Case the 4th, the Course by D. R. being more than 6 Points.

By D. R. since last Obfer.	Course	—	W. by S. $\frac{1}{2}$ W.
	Distance	—	93 Miles
	Difference of Lat.	—	9 S.
	Departure	—	93 W.
	Latitude by D. R.	—	41 02 N.
	Lat. by Obfer.	—	41 11 N.

Cor- rected	Course	—	West
	Distance	—	93 Miles
	Difference of Lat.	—	00
	Departure	—	93 W.
	Lat. by D. R.	—	41 02 N.
	Lat. by Obfer.	—	41 11 N.
	Meridian Dist.	—	8 18 W.
	Longitude made	—	11 56 W.
	Longitude in	—	15 41 W.

Note, When the Course is due East or due West, as in this Case, then the Difference of Longitude cannot be found by the Course, and the Meridional Difference of Latitude as before, but must be found as follows; look in the Tables of Difference of Latitude and Departure, for the nearest Degree to your Latitude, which here is 41, and in some of the Difference of Latitude Columns belonging to that Degree find your Departure, which in this Case is 93, the Distance answering to that which is 123, gives your Difference of Longitude.

H.	K.	H K F.	Courses	Winds	Lee-way	Transactions, Thursday, May the 25th, 1780.			
2	4	1	S by W	N		Little Wind and Hazy all these 24 Hours.			
4	3	1							
6	3								
8	3								
10	3		S S W	N W					
12	3								
2	3					Variation $\frac{1}{2}$ Point Westerly.			
4	3								
6	3		SbW $\frac{1}{2}$ W	W N W					
8	3								
10	3								
12	3								
Courfe	Diff.	S	W	Lat by DR	Lat. by Ob	Mer. Dist.	Lon. made	Lon. in	
S 11 00 W	76	74	14	39 57 N		8 32 W	12 15 W	16 00 W	

Courses	Diff.	N.	S.	E.	W.
S $\frac{1}{2}$ W	28		27.9		2.7
S by W $\frac{1}{2}$ W	24		23.0		7.0
S by W	24		23.5		4.7
			74.4		14.4

By	{	Courfe ——— S.	11 00 W.
		Distance ———	76 Miles
		Difference of Lat.	74 S.
		Departure ———	14 W.
		Lat. by D R ———	39 57 N.
D.R.	{	Lat. by Obser.—	
		Meridian Distance	8 32 W.
		Longitude made	12 15 W.
	{	Longitude in—	16 00 W.

Note, Having in the foregoing Days Works given an Example to every Case of correcting, (for a single Day) I shall now set down two or three Days Work by D. R. and then shew how to correct them all together by an Observation, that is, how to correct for a longer Time than one Day.

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H.	K.	H K F.	Courfes	Winds	Lee-way	Tranfactions, Friday, May the 26th, 1780.		
2	3	1	S S W	W by N		Little Wind and Cloudy.		
4	3	1						
6	4							
8	4		S by W	W				
10	4							
12	3	1						
2	3	1	S	W S W		Variation $\frac{1}{4}$ Point Westerly.		
4	3	1						
6	3							
8	3		SbW $\frac{1}{2}$ W	W				
10	3							
12	3	1						
Courfe	Dist.	S	W	Lat by DR	Lat. by Ob	Mer. Dist.	Lon. made	Lon. in
S 12 00 W	83	82	17	38 35 N		8 49 W	12 38 W	16 23 W

Courses	Dist.	N.	S.	E.	W.
by W $\frac{3}{4}$ W	30		28.2		10.1
S $\frac{3}{4}$ W	29		28.7		4.3
S $\frac{1}{4}$ W	12		12.0	0.6	
S by W $\frac{1}{4}$ W	13		12.6		3.2
			81.5	0.6	17.6
					06.6
					17.0

Cor-
rected { Course — S. 12 00 W.
Distance — 83 Miles
Difference of Lat. 82 S.
Departure — 17 W.
Lat. by D. R. — 38 35 N.
Lat. by Obser. —
Meridian Distance 8 49 W.
Longitude made 12 38 W.
Longitude in — 16 23 W.

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H.	K.	H K F.	Courses	Winds	Lee-way	Transactions, Saturday, May the 27th, 1780			
2	3	I	SbW $\frac{3}{4}$ W	W by N		Little Wind and fair Weather			
4	3	I							
6	3	I							
8	3								
10	3	I							
12	3								
2	3		S by W	W		Variation $\frac{1}{4}$ Point Westerly.			
4	3								
6	3	I							
8	4								
10	3	I							
12	3								
Courfe	Dist.	S	W	Lat by DR	Lat. by Ob	Mer. Dist.	Lon. made	Lon. in	
S 14 00 W	74	72	17	37 23 N		9 06 W	13 1 W	16 46 W	

Courses	Dist.	N.	S.	E.	W.
SbW $\frac{1}{2}$ W	46		44.0		13.3
S $\frac{3}{4}$ W	28		27.7		4.1
			71.7		17.4

By	Courfe	— S. 14 00 W.
	Distance	— 74 Miles
D.R.	Difference of Lat.	— 72 S.
	Departure	— 17 W.
	Lat. by D R.	— 37 23 N.
	Lat. by Obser.	—
	Meridian Distance	— 9 06 W.
	Longitude made	— 13 01 W.
	Longitude in	— 16 46 W.

H.

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H.	K.	H	K	F.	Courfes	Winds	Lee-way	Tranfactions, Sunday, May the 28th, 1780.	
2	4				S by W	W by N		Moderate Gales and Fair.	
4	4								
6	4								
8	4								
10	4								
12	4							Variation $\frac{1}{4}$ Point Westerly.	
2	4				SbW $\frac{1}{4}$ W				
4	4								
6	4								
8	4								
10	4								
12	4								
Courfe	Diff.	S.	W	Lat by DR	Lat. by Ob	Mer. Diff.	Lon. made	Lon. in	
S 9 00 W	108	107	17	35 48 N.	35 36 N.	9 23 W	13 19 W	17 04 W	

Courfes	Diff.	N.	S.	E.	W.	By D.R. fince yester- day noon	Course — S. 10 00 W.	
S $\frac{3}{4}$ W	48		47.5		7.0		Distance —	96 Miles
S by W	48		47.1		9.4		Diff. of Lat. —	95 S.
			94.6		16.4		Departure —	16 W.
							Latitude by D.R.	35 48 N.
							Latitude by Ob.	35 36 N.

Now being to correct from the last Observation, which was on Wednesday, May 26, I take the Northing, Southing, Easting, and Westing for every Day since, and bring them into a Traverse-Table as follows.

By D.R. fince the last Obfer. vation.		N.	S.	E.	W
	On Thursday, May 25		74		14
	On Friday 26		82		17
	On Saturday 27		72		17
	On this as above 28		95		16
	Whole Diff. of Lat. by D.R. S. 323 Dep. 64 W.				
	Gives Courfe by D.R. fince last Obfer. S. 11.00 W.				

My Course found by D. R. since the last Observation, being S. 11 00 W. which is less than 33 Degrees, I am to correct by Case the 2d, (Page 48) and to find every Thing, except the Distance, as follows ;

First, *For the true Difference of Latitude.*

Take the Latitude by the last Observation	_____	41 11 N.
And the Latitude by Observation To-day	_____	35 36 N.
		<hr/>
Gives the Difference of Latitude	_____	5 35 S.
		<hr/>
Which multiplied by 60, makes	_____	335 Miles.

Second, *For the true Course.*

The Course by D. R. since the last Observation, being S. 11 00 W. I set it down for the true Course, as *per Rule* in Case the 2d.

Third, *For the true Departure.*

With the true Course 11 Degrees, and the true Difference of Latitude (divided by 2, because too great to be found in the Tables) which makes it 167.5, (by *Plane Sailing*, Case the 2d) I find the Departure 32.6, which multiplied by the same Number the Difference of Latitude was divided by, *viz.* 2, gives 65.2 Tenths for the true Departure.

Fourth, *For the Meridian Distance.*

Take the Meridian Distance at the last Observation	_____	8 18 W.
And the true Departure	_____	1 05 W.
		<hr/>
Gives the Meridian Distance To-day	_____	9 23 W.

Fifth, *For the Difference of Longitude.*

Take the Meridional Parts of the last Observation	_____	2716
And the Meridional Parts of To-day's Observation	_____	2288
		<hr/>
Gives the Meridional Difference of Latitude	_____	428
		<hr/>

With the Half of which _____ 214
(because the whole is too large to be found in the Tables) and the true Course 11 Degrees, I find the Difference of Longitude 41.6, which doubled (because the other was halved) gives, for the whole Difference of Longitude, 83 Miles.

X

Sixth,

Sixth, *For the Longitude made.*

Take the Longitude made in the last Observation	d. m.
And the whole Difference of Longitude	11 56 W.
	1 23 W.
Gives the Longitude made	13 19 W.

Seventh, *For the Longitude in.*

Take the Longitude in the last Observation	d. m.
And the whole Difference of Longitude	15 41 W.
	1 23 W.
Gives the Longitude in	17 04 W.

		d. m.			
	{ Course	S. 11 00 W.			
	{ Distance				
	{ Difference of Latitude	335 S.			
	{ Departure	65 W.			
Corrected	{ Latitude by D. R.	35 48 N.			
	{ Lat. by Observation	35 36 N.			
	{ Meridian Distance	9 23 W.			
	{ Longitude made	13 19 W.			
	{ Longitude in	17 06 W.			

these to be
found again
as follows.

d. m.
S. 9 00 W.
108 Miles
107 S.
17 W.

The Course, Difference of Latitude and Departure, as above, being what has been made since the last Observation (which was four Days ago) and as it is usual to set them down only as they are made from Noon to Noon, therefore they are to be rubbed out, and found again as follows :

	d. m.
First, Take the Latitude by D. R. Yesterday	37 23 N.
And the Latitude by Observation To-day	35 36 N.
Gives the Difference of Latitude	1 47 S.
Second, Take Yesterday's Meridian Distance	9 06 W.
And the Meridian Distance To-day	9 23 W.
Gives the Departure	0 17 W.

Then, with the Difference of Latitude 107, and the Departure 17 Miles, (by *Plane Sailing*, Case 6.) I find the Course to be 9 Degrees, Distance 108 Miles, as above.

A Journal from *England* towards *Madeira*. 155

H.	K.	H K F.	Courses	Winds	Lee-way	Tranſactions, Sunday, May the 28th, 1780.
2	5		S by W	N		By Reckoning I make my Course from the <i>Start</i> to the Iſland of <i>Madeira</i> S. 32 00W. Distance 420 Leagues; Meri- dian Distance and Difference of Latitude as underneath.
4	5					
6	6	I				
8	7					
10	7	I				
12	8					
2	8					At Noon ſaw the Iſland of <i>Madeira</i> , bearing S.W. by W. Distance 14 Leagues. Varia- tion 00.
4	8					
6	8	I				
8	8	I				
10	9					
12	9					

Courſe	Diſt.	S	W	Lat by DR	Lat. by Ob	Mer. Diſt.	Lon. made	Lon. in
S 19 00 W	213	102	70	32 14 N		10 32 W	4 43 W.	18 30 W

Courses	Dist.	N.	S.	E.	W.
S by W	182		178.5		35.5
SW by W	42		23.3		34.9
			0.8		70.4

Courfe	S. 19 00 W.
Distance	213 Miles
Difference of Lat.	202 S.
Departure	70 W.
Lat. by D.R.	32 14 N.
Meridian Distance	10 33 W.
Longitude made	14 43 W.
Longitude in	18 30 W.

The Bearing of the Land being SW. by W. distant 14 Leagues, or 42 Miles, I set them in the Traverse-Table as a Course, &c.

It being customary upon making the Land, to find what Course and Distance the Ship has made, by reckoning from the Place sailed from, to the Place arrived at, it is to be done as follows :

C A S E the First. *When you keep the Account of Longitude in.*

With the Latitude and Longitude of the Place you sailed from, and the Latitude and Longitude you are in by your Reckoning on the Day you make the Land, find the proper Difference of Latitude, the Meridional Difference of Latitude, and the Difference of Longitude in Miles, and with them find the Course and Distance, as is shewn at large in *Mercator's Sailing*, Case the First, Page 55.

C A S E the Second. *When you keep the Account of Longitude made.*

Then the proper Difference of Latitude, and the Meridian Difference of Latitude are to be found as before, and the Difference of Longitude is to be found, by bringing the Longitude made into Miles, with which proceed, as in Case First, The

The Agreement between these two Ways may be seen as follows :

On the 29th of May, when I made the Land, my Longitude in was	18 30 W.	On the same Day my Longitude made was	14 43 W.
Long. of the Start, or Place sailed from -	3 47 W.	Which multiplied by	60
The Difference of Longitude	14 43 E.	Makes the Diff. of Long.	883 Miles
Which multiplied by	60	The same as in the other Case.	
Makes	883 Miles.		

To find the Bearing and Distance of any Place from the Ship, upon any given Day.

Example. Suppose I would know how *Madeira* bore from me, and what Distance on the 23d of *May*, by the foregoing Journal.

First, Supposing I kept only the Account of Longitude in ;

Then, with the Latitude in	41 11 N.	2716 M. P.	And with Long. in	15 43 W.
And the Latitude of <i>Madeira</i>	32 44 N.	2080 M. P.	And the Long. <i>Madeira</i>	7 26 W.
I find the proper Diff. of Lat.	8 27 S.	636	I find the Diff. Long.	1 43 W.
Which multiplied by 60 makes	507 Mi.	M. D. L.	Which makes	103 Miles.

Then with that Meridional Difference of Latitude, and Difference of Longitude, I find the Course to be S. 09 00 W. and the Distance 501 Miles, as in *Mercator*, Case 1.

But if I had kept only the Account of Longitude made, which is Difference of Longitude, then,

With the Longitude sailed from ———— 3 47 W.
And the whole Difference of Long. or Long. made — 11 56 Westerly,

By Rules for Long. (Page 107) I should have found Long. in 15 43 W.

And then I have given the Latitude and Longitude in, &c. as before.

I have, in the foregoing Journal, shewn how to correct, either for a single Day, or for a longer Time, and given Examples of every Case for correcting from one Observation to another ; but as it may happen that you may be some Days at Sea, from the Time of your leaving the Land, before you have an Observation, and that when you get the first Observation, you may have Occasion to correct, and there being nearly the same Difference between working the Correction from one Observation to another, and between the first Observation and the Land, as there is between working the first Day's Work, and any of the following Days, I shall here give an Example from the foregoing Journal.

To correct from the Time of leaving the Land to the first Observation.

Example. Suppose that in the foregoing Journal, on the 13th of May, I was by Observation in Lat. 45 10 N. my Latitude by D. R. being 45 23 N. my Southing by D. R. 95, and Westing 24.

Now being to correct, and having had no Observation before To-day, I must correct from the very beginning of my Journal, that is, from the Time of my leaving the Land, by bringing the Northing, Southing, Easting and Westing, for every Day I have been at Sea, into a Traverse-Table as follows.

By D. R. from the
Time of leaving the
Land.

	N.	S.	E.	W.
On the first Day.		93		53
On the second Day.		96		61
On the Day I correct.		95		24
Whole Difference of Lat. by D. R. - S. 284 Dep. 138 W.				

Gives the Course by D. R. from the Time of leaving the Land S. 26.00 W.

The Course found by D. R. from the Time of leaving the Land, being less than 33 Degrees, I am to correct by Case the Second, and to find every Thing, except the Distance, as follows :

First, For the true Difference of Latitude.

Take the Latitude of the Place sailed from ————— 50 07 N.
And the Latitude in by Observation ————— 45 10 N.

Gives the true Difference of Latitude ————— 4 57 S. or 297 Miles.

Second, For the true Course.

The Course by D. R. since the Time of leaving the Land being S. 26 00 W. I set down for the true Course, as by the Rules for correcting.

Third, For the true Departure.

With the true Course 26 Degrees, and half the true Difference of Latitude 148.5, (because the whole is too large to be found in the Tables) by *Plane Sailing*, Case the Second. I find the Departure 72.3, which being doubled (because the Difference of Latitude was halved) gives 144.6 for the true Departure.

Fourth, For the Meridian Distance.

Whenever you correct from the Time of your leaving the Land (as you do here) the Meridian Distance will always be the same as the true Departure found by correcting which in this Case is 145 Miles, or 2.25 W.

Fifth

Fifth, *For the Difference of Longitude.*

Take the Meridional Parts of the Latitude sailed from _____ 3485
 And the Latitude in by Observation _____ 3044
 Gives the Meridional Difference of Latitude _____ 441

With the Half of which _____ 220.5
 (because the whole is too large to be found in the Tables) and the true Course 26 Degrees (as directed in the first Day's Work, Page 134) I find the Difference of Longitude 107.4, which doubled (because the other was halved) gives the true Difference of Longitude 214.8.

Sixth, *For the Longitude made.*

Whenever you correct from the Time of your leaving Land, as you do in this Case, then the Longitude made will always be the same as the whole Difference of Longitude found by the Correction, which in this Case is 215 Miles, or 3.35 W.

Seventh, *For the Longitude in.*

Take the Longitude of the Place you sailed from _____ d. m.
 And the whole Difference of Longitude _____ 3 47 W.
 Gives the Longitude in _____ 3 35 W.
 Gives the Longitude in _____ 7 22 W.

Corrected	{	Course _____	S. 26 00 W.	{ These to be found again }	S. 16 00 W.
		Distance _____			113 Miles
		Diff. of Latitude _____	297 S.		108 S.
		Departure _____	145 W.		31 W.
		Latitude by D. R. _____	45 23 N.		
		Lat. by Observation _____	45 10 N.		
		Meridian Distance _____	2 25 W.		
		Longitude made _____	3 35 W.		
	{	Longitude in _____	7 22 W.		

The Course, Difference of Latitude and Departure, as above, being what has been made in the whole, from the Time of leaving the Land, which is three Days, and as it is usual to set them down only as they are made from Noon to Noon, therefore they are to be rubbed out, and found again as follows :

First, Take the Latitude by D. R. Yesterday _____ d. m.
 And the Latitude by Observation To-day _____ 46 58 N.
 Gives the Difference of Latitude _____ 45 10 N.
 Gives the Difference of Latitude _____ 1 48 S.

Second, Take the Meridian Distance Yesterday _____ 1 54 W.
 And the Meridian Distance To-day _____ 2 25 W.
 Gives the Departure _____ 0 31 W.

Then

Then with the Difference of Latitude 108, and the Departure 31 Miles (by *Plane Sailing*, Case 6.) I find the Course to be S. 16 00 W. Distance 113 Miles, as above.

Having, in the preceding Journal, shewn how to find what Latitude and Longitude the Ship is in, on any Day, I shall in the next Place shew how

By that Longitude and Latitude in, to mark off the Place of the Ship on the Mercator's Chart.

Rule. Lay a Ruler across the Chart, in the Latitude your Ship is in, then look upon the Equinoctial, or Line marked with the Degrees of Longitude, for the Longitude your Ship is in by your Reckoning, and setting one Foot of your Compasses in that Longitude, take the nearest Distance to some North and South Line, and from where that Line crosses the Edge of the Ruler which lies in the given Latitude, lay off the same Distance, by the Edge of the Ruler, to the Right Hand, if the Longitude you are in be to the Right Hand of the North and South Line, or to the Left Hand, if it is to the Left; where this falls will be the Place of the Ship. But this will only serve when the Longitude marked off the Chart, and your Reckoning of Longitude in, are both counted from the same Meridian, therefore for a general Rule, take the following

By the Latitude in, and Longitude made, to mark off the Ship's Place, &c.

Rule. Set one Foot of your Compasses in the Place you take your Departure from, and take the nearest Distance to some North and South Line, and from where that Line falls upon the Equinoctial, or Line marked with the Degrees of Longitude, set off that Distance the same Way as the Place lies from it (that is, to the Right Hand, if the Place lies to the Right Hand of the North and South Line, or to the Left Hand, if it lies to the Left) and make a Mark with a black Lead Pencil; this Mark will serve to mark off by, until you come to take a new Departure, and then you rub it out, and make a new one, as before.

Then lay a Ruler across the Chart in the Latitude you are in, and taking so many Degrees in your Compasses (from the Line of Longitude) as your Longitude made comes to, set them off from your Black Lead Mark to the Eastward, if the Longitude made be East, or to the Westward, if it be West; where this falls will be the Longitude the Ship is in by the Chart, from which take the nearest Distance to some North and South Line, and from where that Line, &c. as in the first Case.

The Ship's Place on the Mercator's Chart being found, as before taught, it remains in the next Place to shew how to find the Bearing and Distance of any Place from the Ship; and first,

To find how any Ship bears from the Place.

Rule. Lay a Ruler from the Place of the Ship to the Place you would know the Bearing of, then set one Foot of your Compass in the Center of some Compass near the Ruler, and take the nearest Distance to the Edge of the Ruler, then move one Foot of your Compasses along by the Edge of the Ruler, and observe what Point of the Compass the other comes nearest to, which will be the Bearing required.

To

To find the Distance of any Place from the Ship.

Case the 1st. If the Place be under the same Longitude that the Ship is in, (that is, if it bears due North or due South) then the Difference of Latitude between them, (found as by the Rules for Latitude, Page 105) and turned into Miles, or Leagues, will be the Distance.

Case the 2^d. If the Place be in the same Latitude that the Ship is in, that is, if it bears due East or due West, then take half the Distance between the Ship and the Place, in your Compasses, and setting one Foot (on the Line marked with Degrees of Latitude) in the Latitude the Ship is in, see what Latitudes the other Foot will reach to, both above and below it; the Difference between these two Latitudes, found as per Rule for Latitudes, will be the Distance required.

Case the 3^d. If the Place be neither in the same Latitude nor Longitude with the Ship, then take the Difference of Latitude between them, in Degrees from the Equinoctial Line, and laying a Ruler from the Ship to the Place, apply one Foot of the Compasses so to the Edge of the Ruler, that the other Foot turned about may just touch some East and West Line which is crossed by the Ruler; then take the Distance along the Edge of the Ruler, from the Place where the Compasses rested, to the Place where the Ruler crosses the said East and West Line; that Distance measured on the Equinoctial, or Degrees of Longitude, will give the Distance in Degrees, which you may turn into Miles or Leagues; and in the same Manner as you find the Bearing and Distance of any Place from the Ship, you may also find the Bearing and Distance of one Place from another.



F I N I S.

